THE WELDING ENGINEER

SEPTEMBER, 1952

Give

The United Way

for ALL Red Feather Services

A citizen army . . . two million strong . . . goes into action in October. Volunteers in a united campaign to raise money for some 17,000 Red Feather services, these men and women will solicit their fellow citizens for contributions to home town agencies and national health and welfare programs such as those made necessary by the defense effort.

This once-a-year campaign by the country's Community Chests and the United Defense Fund insures the health and welfare services so vital to the entire community.

Volunteer *your* time now to your town's united Red Feather campaign.

A McGRAW-HILL PUBLICATION

RUGGED DEPENDABLE CABLE

FOR 50 YEARS *Wiremaker for Industry*

To You,

Belden's Golden Anniversary Means

—product performance that can come only from a "know-how" that has grown through actual service since the early days of the construction industry.

—an ability to cooperate in pioneering new wires to meet or anticipate industry's growing needs.

In the years that follow This Belden Program Is—

TO BE CONTINUED

● Belden Welding Cable represents the best in a balanced cable design, meeting all service requirements without sacrificing any one of them. The conductor, the separator, and the jacket are designed to convey the maximum electrical energy to the electrode at all times, assuring a more stable arc.

Each cable is conditioned for flexibility, twisting, abrasion, impact, and heat. Other properties include high resistance to aging, moisture, oils, most acids, and alkalies. Specify Belden.

Belden Manufacturing Co.
4677-A W. Van Buren St.
Chicago 44, Illinois

Belden *Welding* CABLE

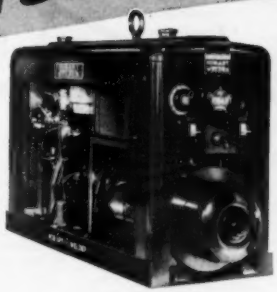
HOBART

The combination of a good welder and a good electrode simply can't be beat . . . it always adds up to higher quality, lower cost welding

Hobart Welders, long the choice of leading welding operators—and Hobart Electrodes, made in types and sizes to handle any job make such a combination. They've already brought extra profits to a host of America's foremost manufacturers . . . and they can do the same for you. Mail the coupon today for complete details.

WELDERS and ELECTRODES

Hobart Electric Drive Welder



"Pipeliner" Welder

Gas Drive Welder

Accessories

. . . are an important part of the welding team, too. Hobart's do a better job . . . last longer. Check coupon for details.

HOBART BROTHERS CO., Box U-92, Troy, Ohio

"One of the world's largest builders of arc welders"

Free!

Check here for ☐ vest pocket guide "How to get better Welds"

HOBART BROTHERS CO., BOX U-92, Troy, Ohio

Without obligation, send me information on items checked below.

☐ Electric Drive Welder ☐ Pipeliner ☐ Gas Drive Welder

Send me ☐ Welder Catalog ☐ Electrode Catalog ☐ Accessory Catalog

NAME_____ POSITION_____

FIRM_____

ADDRESS_____

CESCO RIGHT... before your Eyes!

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Guardian Safety Equipment Co.
427½ Moreland Avenue, N. E.

BIRMINGHAM, ALA.
Guardian Safety Equipment Co.
4215 1st Ave. No.

BOSTON, MASS.
General Equipment Corporation
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BUFFALO, N. Y.
The Watson Company
1443 Main Street

CHICAGO, ILL.
Universal Safety Equipment Co.
5115 Diversey

CINCINNATI, OHIO
Williams & Co., Inc.
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CLEVELAND, OHIO
Williams & Co., Inc.
3700 Perkins Avenue

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THE WELDING ENGINEER

A McGRAW-HILL PUBLICATION

VOLUME 37 NUMBER 9

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F. P. Di Toro
Eastern Manager, New York, Tel. LOngacre 4-3000

E. J. McOsker
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Western Manager, Chicago, Tel. WHitehall 4-7900

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Tel. MAdison 6-4323

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68 Post Street, San Francisco, Calif.
Tel. Douglas 2-4600

James Cash
First National Bank Bldg., Dallas, Tex.
Tel. Prospect 7-5064

John Doyle
Business Manager

THE WELDING ENGINEER • SEPTEMBER • Vol. 37—No. 9

(with which is combined The Acetylene Journal)
Member ABC and ABP

Published monthly, with an additional directory number in June, by McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder. Publication Office: 671 North Franklin Street, Chicago 10.

Executive and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Division; Ralph B. Smith, Vice-President and Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.

Editorial Office: 520 N. Michigan Ave., Chicago 11, Ill.

Subscriptions: Address correspondence to J. E. Blackburn, Jr., director of circulation, The Welding Engineer, 671 North Franklin St., Chicago 10, Ill., or 330 W. 42nd St., New York 36, N. Y. Allow one month for change of address. Subscriptions are solicited only from executives, engineers, technicians and supervisory personnel in plants engaged in production or maintenance welding processes. Position and company connection must be indicated on subscription orders.

Single copies 35c. Subscription rates—United States and possessions $3 a year; $4 for two years; $5 for three years. Canada $5 a year; $8 for two years, and $10 for three years. All other countries $15 a year; $25 for two years; $30 for three years. Entered as second class matter Aug. 23, 1948, at the Post Office at Chicago, Ill., under Act of Mar. 3, 1879. Printed in U.S.A.

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THE WELDING ENGINEER is indexed regularly by Engineering Index, Inc.

SEPTEMBER, 1952

COVER: **This all-welded rotary kiln is 170 ft long by 8½ and 9 ft in diameter. Photo from Allis-Chalmers Mfg. Co.**

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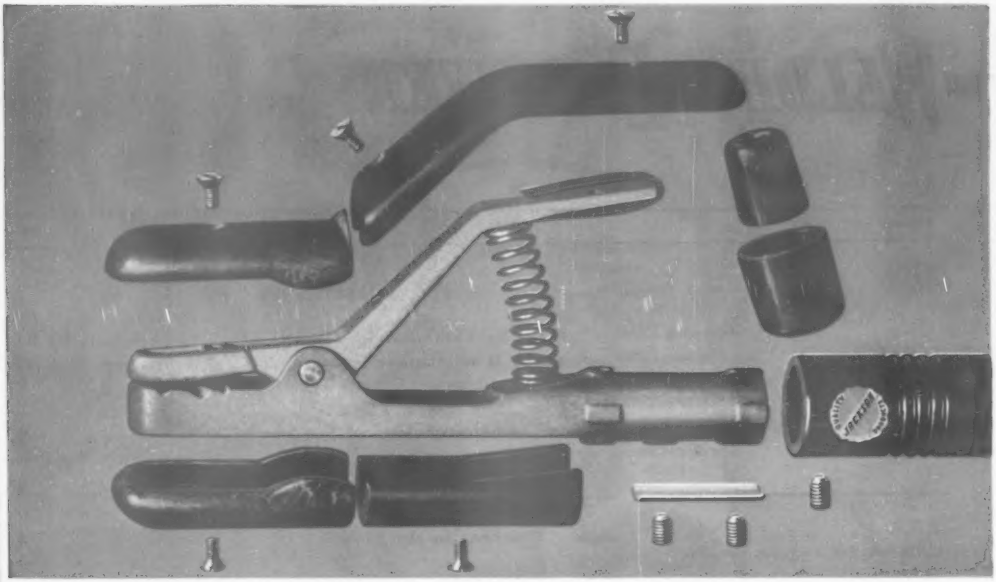

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PRODUCTS
WARREN · MICHIGAN

Arc-Welding Electrode Holders, Ground Clamps and Cable Fittings . . . Helmets, Goggles and Eyeshields . . . Sold World-Wide through Distributors and Dealers

In selecting an electrode holder don't overlook this question: *what does it cost to keep that holder in operation?*

Compare the replacement part prices of Jackson holders types A-1 and A-3 with two competitive makes of similar capacity. All are built on the same general principle; all have copper alloy tongs with insulated jaws.

COST OF ALL PARTS	300-AMP MODEL	500-AMP MODEL
Jackson	$5.47	$6.91
Make "B"	5.64	7.14
Make "C"	5.99	7.54

That's one each of every part that makes up these holders. However, for economical reasons, you'll want to replace some parts more than others. Experience shows that, in all holders of this type, the jaw insulators are replaced most often.

JAW INSULATORS, PAIR	300-AMP MODEL	500-AMP MODEL
Jackson	$ .70	$ .75
Make "B"	.90	1.00
Make "C"	1.20	1.50

There is no question about the durability of Jackson insulators as compared to any on the market, and we'll assume the cost of installation to be the same. This, then, is the conclusion . . .

Jackson Holders save you up to 75c each time a holder of this general type requires new jaw insulators, and, generally, they save you money on all replacement parts.

NEWS FROM WASHINGTON

How to Conserve Nickel and Moly

A BIG boost to the nation's effort to stretch the critical supply of nickel, molybdenum and copper is being given by the research of the construction machinery industry, according to word from the National Production Authority.

To cite one example, International Harvester Co. switched from "scarce" nickel and moly alloys to the relatively new chromium-boron steels for certain parts of crawler tractors and trucks. Savings for one month of plant production were 23,474 lb of nickel and 14,001 lb of molybdenum, representing savings of 79% of the nickel formerly consumed and 72% of the former consumption of molybdenum.

Caterpillar Tractor Co. reports savings of over 77 lb of nickel in each D8 tractor as a result of a continuing 10-year effort to conserve critical materials. Caterpillar estimates total nickel savings of almost 12,000 tons over the past ten years. Principal switches in the program have been made from nickel-alloy steel to plain carbon steels hardened by induction heating.

Allis-Chalmers Mfg. Co. reports reductions up to 27% in copper and brass for their water and oil radiators. Generally speaking, these savings were achieved by reducing the thickness of tanks and headers, by reducing fin stock and by reducing tube-wall thickness.

Control Relaxation Is in the Offing

DURING the next few months there will be a considerable change in the self-certification limits. This means that smaller companies will not need to come to NPA for "tickets."

All users of small quantities of controlled materials should keep in touch with NPA and up-to-date on the department's news releases, regulations and changes.

NPA restrictions may soon be removed, they will either remove controls entirely or liberalize control to affect as few industries as possible. Local offices will be closed and higher authorizations will have to come from Washington, D. C., direct. NPA is asking industry to keep up-to-date on all changes.

Navy Recommends Using 430 Stainless

U. S. NAVY Bureau of Ships is recommending the use of AISI 430 stainless steel (no nickel) in place of AISI 304 for kitchen equipment, ice boxes, cold storage sheeting and bases for furniture.

The welding procedure is specified on each individual application only.

Welding Equipment Expansion Goal Set

AN EXPANSION goal of $40,000,000 has been established for metal working equipment. Of this figure $7,200,000 is the goal for the expansion of welding equipment; the goal should be completed by Jan. 1, 1954. Eighteen certificates of necessity have been allowed for a total of $3,104,197; three are pending for $3,235,114 and the established amount for future certifications to Jan. 1st, 1953 is $859,949.

Certificates of necessity allowed were for the manufacture of special types of resistance-welding equipment and low-hydrogen electrodes.

To date and in the foreseeable future, there has not and will not be a shortage of facilities in welding manufacturing equipment.

Certificates have been granted only in those cases where new types of welding equipment or electrodes are to be produced.

Most of the shortages, over the past two years, have been materials rather than facilities shortages. The welding industry is capable of producing considerable more than it does at present.

Nickel Supply Won't Meet Demand

NATIONAL Security Resources Board reports paint a dismal picture in the nickel situation. We only produce 165,000 tons a year and when all expansion programs are complete by 1955, we can only add 40,000 tons to our present annual supply.

Outside the Russian bloc, only Canada, New Caledonia, the United States and the Union of South Africa produce nickel. The U. S. and So. Africa jointly produce only 1,000 tons annually, yet the U. S. is by far the largest user of the 28 nations in the International Materials Conference.

There will be susbstantial production from the Nicara project in Cuba, starting this year, and from low-grade deposits in a dozen other countries.

The President's Material Policy Commission has reported that if the low-grade ores in these countries could be economically developed, the supply "could satisfy any foreseeable level of the free world demand in the next 25 years." However, the MSRB report makes it clear the outlook is for scarcity under current production and plans for expansion.

The report contains details for uses of nickel substitutes.

Revised DO Ratings and Symbols List Ready

DEFENSE Production Administration has issued a revised list of allotment and DO rating numbers and symbols. This list is used by federal claimant agencies to authorize production and construction schedules and in making allotments of controlled materials.

The symbols in the new list must be used for authorizations under orders and regulations of the NPA. It also contains five additional symbols not on the last list issued in February.

NEWS FROM WASHINGTON

Metals in Short Supply under Expansion Goals

AN ITEM of national interest is the enormous amount of expansion planned for metals in short supply. To date, the total is 436 expansion projects for this year. All metals in slightly reduced supply have goals set for them, tungsten ores, antimony, titanium, beryl and barite are only a few that were recently announced by the Defense Production Administration. The total industrial outlay involves nearly $672,000.000.

Self Authorization Changing Weekly

DIRECTION 17 to CMP Reg. 1 provides that beginning with the 1st quarter of 1953, a producer of welding equipment and supplies *who did not receive* third quarter, 1952, allotments on a CMP-4-B application, may self-authorize purchase orders only if his total requirements of controlled materials do not exceed 25 tons of carbon steel, 500 lb of nickel-bearing stainless steel, 10,000 lb of copper and 20,000 lb of aluminum.

The direction permits such porducers to use allotment symbol SU to obtain controlled materials and the rating DO-SU to secure other materials.

Scuttlebut is the government is prepared to permit wide-scale "automatic" allotments of relatively large quantities of controlled materials, orders starting the first quarter of 1953. DPA Administrator Fowler confirmed the new procedure to be announced soon in a direction to CMP Reg. 1.

This will release a large number of manufacturers from the necessity of filing first-quarter applications.

Those in the "know" said such a program will permit steel consumers whose third quarter allotments were 600 tons or less of carbon steel to issue their own first-quarter allotments as long as they do not exceed the amount they used in the third quarter.

End of Road Seen for Tax Write-Offs

WHOEVER is elected is going to have to face the possibility of an economic slack.

Business has been forced to expand because of the demand for goods created by the Korean War. Important to this expansion are the fat plums which the Administration was willing to allow in the fast tax write-offs. Under the double impetus, industry started enormous plant and factory construction that is now running at the rate of $2,000,000,000 a month, but the end of the road is in sight for the tax write-offs. Markets are getting softer and profits lower so capital investments wil level off. Officials hope it won't slack off, but capital investment is already showing signs of softening.

Buy 50,000 Tons of Foreign Copper

COPPER division of NPA reports that more than 50,000 short tons of foreign refined copper were "picked up" or purchased by U. S. processors or consumers during July. This is all they were entitled to purchase under the International Materials Agreements.

The purchases would not have been possible under the previous domestic price OPS allowed, which is 24½c a pound. However OPS allowed 80% of the difference in cost of the foreign copper, above the 24½c domestic price to be passed on to the ultimate user or consumer.

New Order Speeds Arms Requirement

DIRECTION 15 to CMP Reg. 1 is designed to insure that all authorized controlled materials orders placed with steel producers in support of military, atomic energy and machine tools programs, pursuant to third quarter allotments are delivered not later than Nov. 30, 1952. When a producer is unable to make shipments against orders bearing the symbols of these programs by the above date he is required to rearrange his production schedule and give preference to such orders.

Steel Strike Changes CMP Steel Regulations

DIRECTION 16 to CMP Reg. 1 authorizes steel consumers to place, and steel producers to accept and schedule for delivery through Nov., 1952, all presently unplaced third quarter allotment authorizations.

The direction also provides that steel mills may accept and schedule for shipment through Feb. 1953, fourth quarter allotment authorizations for non-defense programs.

Direction 6 to CMP Reg. 6 gives similar provisions for the construction programs.

An amendment to CMP Reg. 2 is provided to stop over buying. Beginning Sept. 1st and until the end of the year, a manufacturer will not be permitted to accept delivery of an item of controlled steel if by such receipt his inventory of that item would become greater than necessary to meet his requirements during the succeeding period.

Oxygen Consumption Increasing Steadily

OVER four companies are involved in the expansion goals set for increased facilities to manufacture oxygen, nitrogen, calcium carbide and argon.

National capacity as of Jan. 1, 1951, was 21,800,000,000 cu ft of oxygen. Our total requirement by 1955 is figured at 34,600,000,000 cu ft, so the goal has been set to increase production 12,800,000,000 cu ft or 58%.

Certificates of necessity for accelerated tax amortization have been allowed for the increased facilities, and the allowance is in most instances 50% deductible within the five-year period allowed.

the new Koolite* torch...

we sold, to date, 102,396 of this new model torch... and of a prior model over 150,000

it uses either oxygen or compressed air with any of the useable fuel gases—city and natural gas, propane and butane or acetylene.

just select the proper tip type and sizes

it gives you a needle point or brush like flame

This new Koolite Torch offers many advantages — it is always cool to the touch because of its smooth, long lasting plastic handle. The blowpipe is designed to be used with either compressed air or oxygen and any of the useable fuel gases. It will produce a brush like or a needle point flame. The three tips are easily exchangeable. Clear operating instructions are on the box as is also an understandable replacement parts list. You will like the reasonable price and the fine performance of this torch. It is made by one of the oldest welding equipment companies.

*The word "Koolite" is a registered trade-mark.

Price - - - with three tips and wrench only $9.50

Made by National SINCE 1910 **WELDING EQUIPMENT CO.,** San Francisco 5, California

921

"Very Good Performance"
reports user of this
INVINCIBLE
FLUX RECOVERY UNIT

OPERATION KEY

1. Unfused flux falls through screen to hopper below floor.
2. Recovery Hose draws flux up to Primary Separator Tank,
3. which separates usable flux from slag and fine dust.
4. Usable flux returns via this hose to hopper of welding head.
5. This hose connects Primary Separator to Vacuum Producer.
6. Invincible Model 482, the Vacuum Producer for the entire system.

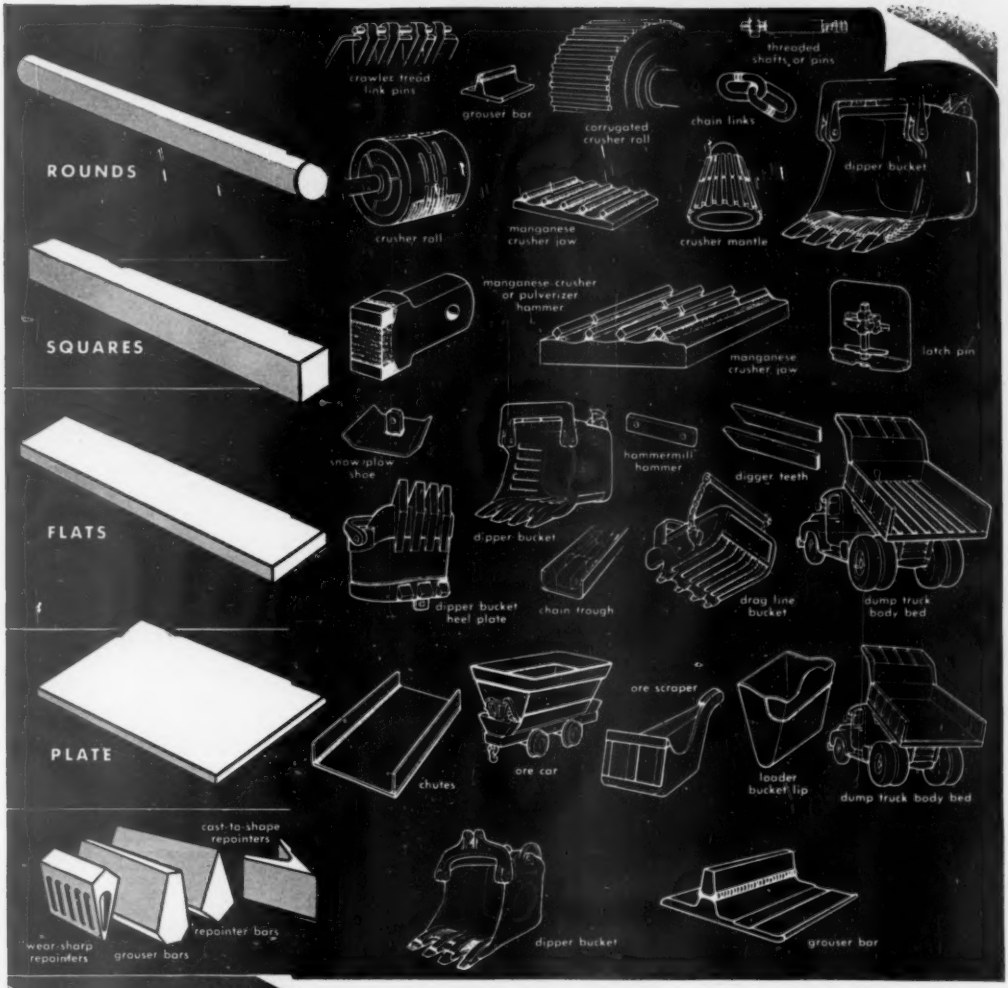
The Euclid Road Machinery Co.—a pioneer in the manufacture of off-the-highway earth moving equipment — operates this Invincible system to reclaim flux on submerged arc welding. The Invincible unit operates automatically, recovering all unfused flux and returning it to the hopper of the welding head in a continuous flow . . . The mechanism on which the primary separator tank and welding head are mounted can be raised or lowered to accommodate various welding positions. Even when the tank is elevated 18 feet above the floor, the Invincible unit operates efficiently. This setup truly demonstrates the flexibility of location that is possible with an Invincible system . . . Also by removing all fine dust (flux flour that often causes porosity in the weld) this Invincible installation helps prevent rejects and speeds welding production.

Available in many sizes and types, the complete line of Invincible Recovery Units offers the right model for every kind of submerged arc welding job . . . To apply the equipment to your needs, Invincible's unexcelled experience in this specialized field is at your service.

FREE FOLDER on Flux Recovery describes and illustrates the complete Invincible line . . . Send for your copy now.

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO
FOR 40 YEARS, LEADERS IN INDUSTRIAL VACUUM EQUIPMENT

AMSCO MANGANESE STEEL WELDMENTS
ADD NEW LIFE TO WORN EQUIPMENT



Amsco Welding Rods and Electrodes For repair welding of manganese steel shapes to worn equipment, American Manganese Steel Electrodes retain their toughness and give real operating savings.

Amscoating with Amsco Hardfacing Rods increases service life . . . reduces shutdowns.

Contact your Amsco Distributor or write for illustrated catalog WA-77 on Amsco Manganese Steel Weldments and Hardfacing Selector Guide.

Brake Shoe **AMERICAN MANGANESE STEEL DIVISION**
382 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que. Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

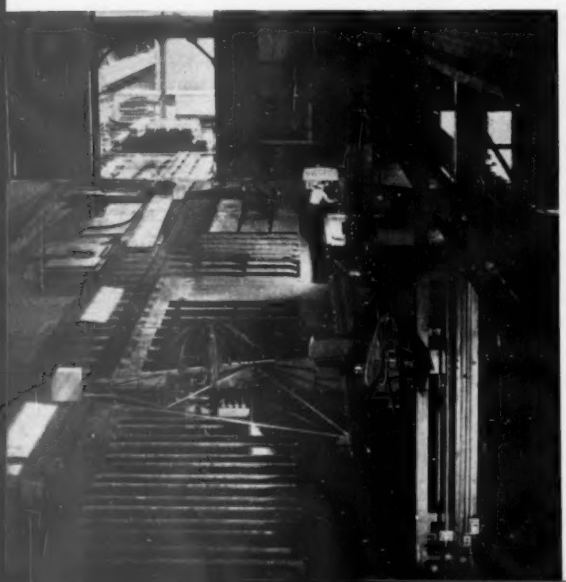
Above: Efficient, low-cost cutting of scrap is assured at the Bronx Iron and Metals Corp., New York, with use of Torchweld 75 Hand Cutting Torches and an up-to-date pipeline gas supply system. Piped from a trailer-serviced oxygen storage bank and an acetylene manifold, gases are conveniently at hand all over the yard from well-type stations, like the one seen in the picture. The steel well-cover closes when the station is not in use to permit normal traffic and yard use of the ground area.

At right: "We have reduced our gas consumption by 33⅓% and substantially cut our labor costs since standardizing on Torchweld equipment and installing an NCG manifold system," says Harvey Wallert, shop foreman; and Gene De Buck, maintenance superintendent, of Knoebel Iron Works, Inc., Chicago fabricators specializing in building steel. "The Torchweld No. 36 cutting torches we use really stand up in hard use. For instance, we use templates for hole piercing ¾-inch stock, and that puts a torch to a tough test. We also use NCG automatic flame cutting equipment, and Sureweld electrodes for electric arc welding."

Short-cuts to Lower Costs

NCG know-how boosts efficiency, increases output and lowers costs in plants of every kind and size throughout the country

Components for barges, towboats, derrick boats and other types of vessels are speedily cut from plate in the shops of the Hillman Barge and Construction Co.'s plant at Alicia, Pa. These two NCG RS Cutting Machines work directly from patterns made in the Hillman pattern loft to cut required shapes. Hillman, designers as well as fabricators, have used NCG products exclusively for the past 10 years.



One of the big answers to today's problem of holding down production costs is the use of more efficient tools . . . tools that will get the job done better and with less working time. If you *weld metals* with the electric arc . . . if you *weld them, braze them, cut them* or *treat them* with the oxy-acetylene flame . . . you'll find that NCG has the tool that will do it with top efficiency. Whether it's on a torch, a welding machine, an electrode or a cutting machine, you'll find—as so many others have—that the NCG trademark means you'll get the job done faster, with less effort, and with better results. And, *especially important now*, you'll find that NCG equipment lasts longer and requires less maintenance.

Representatives at 51 NCG offices and authorized NCG dealers from coast to coast can show you why it pays you to buy NCG products. Call the one nearest you now, or write us.

NCG®

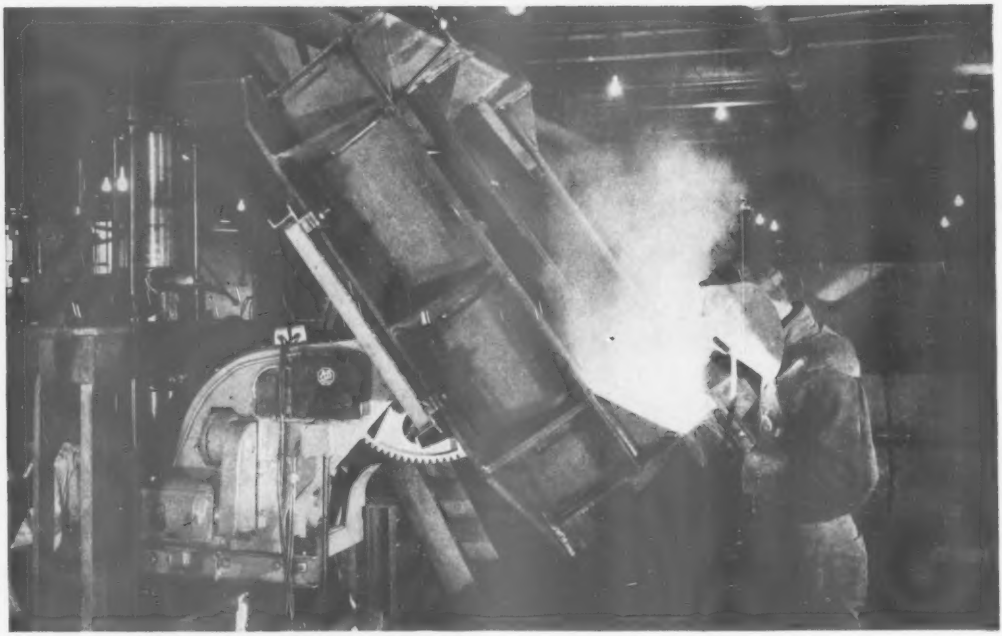
EVERYTHING FOR WELDING

RELY ON NCG

NATIONAL CYLINDER GAS COMPANY

Executive Offices:

840 N. Michigan Avenue, Chicago 11, Illinois



WORTHINGTON WELDING POSITIONER ELIMINATES time-wasting handling of the work-piece . . . increases arc-time by tilting the work into position for continuous, economical downhand welding. Capacities from 100 lbs to 30 tons. Also: Turning Rolls from 3 to 150 tons, stationary and self-propelled.

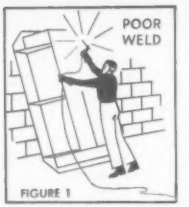
A way to get more and better welding from your welders

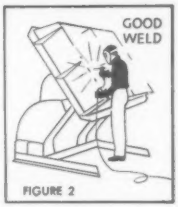
Every minute your welders spend climbing, turning and propping is *lost* welding time.

Turn this waste time into *all arc-time* with Worthington Welding Positioners that tilt or turn all welds into position—*without delay*—for *continuous* downhand automatic or manual welding. Today's labor scarcity makes this increased production more important than ever.

These Positioners lower costs and boost production up to 50%. Downhand welding is *quicker* (only one pass instead of two or three) . . . *better* (deeper penetration with higher current, heavier electrodes, faster deposition of weld metal) . . . *neater* (weld metal levels itself). There's less rod waste, too.

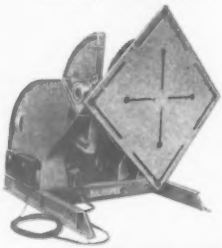
Where can you see a Worthington Welding Positioner at work near you? Just write Worthington Corporation, Plainfield, N. J., for this information or for Bulletin 210D.





HOW WORTHINGTON WELDING POSITIONERS PRODUCE BETTER WELDS

When the welder has to climb over, prop or flop the work-piece, he may only be able to use downhand welding over a limited area (Figure 1). With a Worthington Welding Positioner, the work is continually tilted or rotated automatically into position for downhand welding (Figure 2).



WORTHINGTON'S UNIVERSAL TABLE TOP makes the Welding Positioner as profitable on job work as mass production. Those "T" slots make the table adaptable to any shape of work-piece and a wide range of sizes. No special jigs or fixtures needed.

Y.2.3

WORTHINGTON

Welding Positioners
Turning Rolls

WELDS like this...

FILLET WELD made with ¼" diameter Bronze-Arc on ½" bronze plate.

yours every time with Bronze-Arc

PHOSPHOR BRONZE ELECTRODES

BRONZE-ARC is a phosphor bronze type electrode with heavy extruded coating, designed for all-position operation with reverse polarity on direct current. Produces dense, low-spatter, porosity-free, high-strength welds on bronze, brass, copper... excellent for bronze overlays on cast iron or steel... and to join dissimilar metals. Its smooth, easy-flowing arc eliminates erratic arc action. Use it for maintenance, repair, and fabrication of valve bodies and seats... bushings... bearings... propellers ...guides...impeller blades...gears ... housings ... piping ... couplings and ornamental work. *Write for Bronze-Arc Bulletin AR53-1.*

BRONZE-ARC conforms to A.W.S.-A.S.T.M. Specification No. B-225, Classification ECuSnC. Sizes ⅛", 5/32", 3/16", and ¼" in 14" lengths. Packed in Alloy Rods' 10 lb. all-metal moisture-proof containers.

AR-9

Alloy Rods Co.

LOOK FOR THE FLAMING ARC TRADEMARK

Manufacturers of **Arcaloy** stainless steel electrodes • **Nickel-Arc** and **Nickel-Arc 60** electrodes for cast iron • **Tool-Arc** electrodes for tools and dies • **Wear-Arc** hard-facing electrodes • **Weld-Arc** low hydrogen electrodes. Write for product Bulletins.

ALLOY RODS COMPANY

YORK, PENNSYLVANIA

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You've never seen a handier, more concise Welding Guide. Tells you everything you need to know about welding aluminum, magnesium and stainless steel.

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2. Welding speed.
3. Welding rod diameters (where needed).
4. Argon flow.
5. Helpful information on vertical and overhead welding.
6. Use of ceramic and water-cooled cups.
7. Diameter of the all-important tungsten electrode. *For finest results, always use Sylvania Tungsten Electrodes.*

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New P&H DC Rectifier Welder with Dial-lectric Control

. . . Gives you economy, quiet operation, balanced-line loading, and instantaneous remote control

Now . . . you get low-cost DC welding current without a generator, from this new P&H DC Rectifier Welder — industrial twin to the famous P&H AC Dial-lectric Welder.

No troublesome mechanical devices to control amperage — simply turn a single radio-type knob. There are no moving coils or cores to cause delays and maintenance expense — no bearings, brushes, commutator, brush riggings, etc. to replace.

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New P&H Rectifiers are coming off the production line now. Two sizes: 200 and 300 Amps at 40 V. Be among the first to enjoy the savings this P&H welder helps you realize on power consumption and maintenance. Order your P&H DC Rectifier Welder today.

Ask your P&H representative or distributor for further information on this outstanding unit.

Here's low-cost DC welding power at its best — the P&H DC Rectifier Welder. Note the sturdy construction and absence of moving parts.

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Power Shovels • Crawler and Truck Cranes • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizers • Diesel Engines • Pre-Fabricated Homes

Welding Info-Aids

201 INERT-ARC WELDING GUIDE—Sylvania Electric Products, Inc., Tungsten and Chemical Division, Towanda, Pa. Handy, two-color wall chart has three drop leaves, one each for manual inert-arc welding of aluminum, magnesium or stainless steel. Each page shows typical joints, thickness of metal, welding current, welding speed, welding rod diameter, argon flow and welding hints.

202 PIPE PREPARATION—The Pipe Fabrication Institute, Pittsburgh 22. Four-page bulletin, "End Preparation and Internal Machining for Machined Backing Rings for Butt Welds," supersedes the first standards bulletin issued four years ago. For today's high-pressure, high-heat installations it includes design changes that minimized weld metal needed.

203 WELD REPAIR FITTINGS—Pipe Line Development Co., Cleveland 15. Four-page booklet gives the whole story of "Weld-Ends," special fittings for repairing breaks in pipelines, in large pictures and clear text.

204 SMALL WELDER—Harnischfeger Corp., Milwaukee 14. Bulletin W-71-3 gives full information on Model TR-181 limited input welder having a welding range of 20 to 180 amp. Features of heat control and power consumption are also explained. See page 54.

205 GAS-ENGINE WELDER—A. O. Smith Corp., Welding Products Div., Milwaukee 1. Four-page brochure provides complete data and specifications on new "Field King" gasoline engine-driven welder. Such features as 100% electric control of welding current and idling control are described.

206 $30,000 CONTEST—The James F. Lincoln Arc Welding Foundation, Cleveland 17. Brochure gives rules and conditions of $30,000 mechanical design program open to weldors, job-shop owners, engineers, farmers, students, designers and others interested in the advantages of arc welded machinery of any type.

207 INDUSTRIAL X-RAY—Westinghouse Electric Corp., Pittsburgh 30. Booklet B-4787 briefly describes seven types of X-ray equipment made by Westinghouse for weldments and castings. Types covered include single-column tubes and industrial jib-crane, ultra-high-speed radiograph, mobile, mass inspection, wall-mounted and thickness gage.

208 IGNITRON TUBE—National Electronics, Inc., Geneva, Ill. Single-sheet bulletin describes the NL-5552 metal, water-cooled, mercury pool tube designed especially for welder control and similar a-c control applications. Full technical data on the tube is included on the reverse side.

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TO OBTAIN: (1) manufacturer's catalog or bulletin described on this page; information on (2) a new product item or (3) an advertised product, use the card sections printed below. Insert number of catalog or new products item or page number of advertised product (add initials of the advertiser if more than one ad appears on the page). THE WELDING ENGINEER will ask manufacturers to send the information requested.

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209 TOOL & DIE SALVAGE—Eutectic Welding Alloys Corp., Flushing, N.Y. 64-page manual, profusely illustrated, gives text, charts and diagrams for tool and die salvage by welding. Examples of work include repaired augers, broaches, Mechanite dies, shoe dies, Kirksite dies, mill hammers, reamers, etc.

210 HARD-FACE HOT DIES—Haynes Stellite Co., Chicago 1. 4-page bulletin on Hastelloy Alloy C describes this special hard-facing rod for protecting hot-working parts such as hot forging dies, punches, shear blades, entry guides and rollers. It can be applied by metal-arc welding without preheat. Deposits are machinable.

211 TORCH TIPS — National Torch Tip Co., Pittsburgh 15. Eight-page catalog describes replacement cutting and welding tips for all major makes of oxy-acetylene equipment. Illustrations show styles, sizes and numbers of preheat orifices.

212 GRINDER BULLETIN — Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Mass. General bulletin 500F illustrates and explains facts on the complete line of Rivett cabinet lathes, hand turret lathes, internal and universal grinders.

213 CERAMIC COATINGS—Solar Aircraft Co., San Diego 12, Calif. 24-page brochure tells about the "Solaramic" process for coating thin sheet metal to protect it at high temperatures. Qualities of the coating such as fatigue, impact and corrosion resistance are explained in detail and many excellent pictures illustrate the text.

214 METALLIZING—Metallizing Engineering Co., Inc., Long Island City 1, N.Y. 6-page folder tells how a large underground conduit was metallized with pure zinc and covered with a vinyl aftercoat to provide at least 5 years corrosion protection.

215 CABLE CONNECTIONS — Erico Products, Inc., Cleveland 3. Erico's new 76-page catalog, completely revised, includes 20 pages on bus bar and tubular bus applications. "Cadweld" connections on welding and ground cables as well as electrode holders are illustrated and explained.

216 BRONZE WELDING ALLOYS—Bridgeport Brass Co., Bridgeport, Conn. Twenty-four-page booklet gives the complete story of bronze welding and the company's line of bronze welding rods and electrodes. Complete instructions for welding the various alloys are given, along with drawings and a chart on melting points and colors.

217 SHOP CRANES—Cleveland Tramrail Div., the Cleveland Crane and Engineering Co., Wickliffe, O. Revised edition of booklet No. 2008-H gives an accurate conception of "tramrail" overhead materials handling equipment and how it can be applied to bring about one or more of 15 definite advantages in lower cost, more production, etc.

218 WELDING FACILITIES — Pittsburgh Forgings Co., Coraopolis, Pa. Bulletin No. 5201 reviews the company skills and tools for the engineering, planning, production, heat treating and machining of forgings and for the punching, welding, riveting, assembly and painting of agricultural, auto, transportation and industrial equipment.

219 VAPOR DEGREASING—Randall Mfg. Co., Inc., New York City 59. Eight-page, two-color bulletin No. 6521 shows pictures and describes the operation of standard models of "Ramco" vapor degreasers for cleaning parts before fabrication, before painting, after stamping and between machining operations.

220 CLAMP-TYPE AMMETER—Columbia Electric Mfg. Co., Cleveland 14. Single-sheet bulletin pictures and describes the Columbia a-c volt-ammeter Type AC-1 for checking the current in welding cables, inspecting for broken cables, etc.

221 PIPE MACHINES—Beaver Pipe Tools, Warren, O. Twenty-eight-page booklet gives a complete presentation including pictures of pipe and bolt machines, geared cutters and threaders, four-posters, drop-head threaders, three-ways, cutters, reamers and threading oils. Hints on location and correction of pipe machine troubles are included.

222 INERT-METAL-ARC — Ampco Metal, Inc., Milwaukee 46. Article in current issue of Ampco Welding News tells about the fabrication of floating tube sheets used in acetic acid service welded with the inert-gas consumable electrode process. Other features include the correct selection of r-w tips, hard-facing cast iron gears, die-cutter drive shafts, etc.

223 METAL DETERGENT — Kelite Products, Inc., Los Angeles 12. Bulletin tells about "Kelite PWB No. 81," a rapid-cleaning detergent for aluminum, anodized aluminum and magnesium. Non-foaming and non-corrosive action is explained.

224 MOTOR DRIVES — Worthington Corp., Harrison, N. J., 16-page, two-color catalog tells about "Allspeed" motor drives of from ½ to 7½ hp. Described and pictured are both upright and horizontal drives and discussed are problems in service, electric motors, torques, adverse operating conditions, etc. These motors are installed in welding positioners and wire drawing and coating machines.

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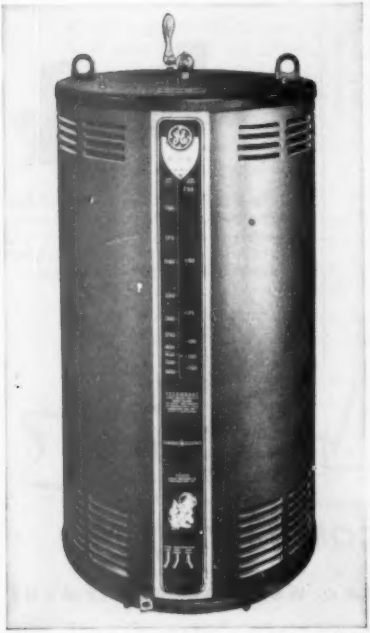
THE WELDING ENGINEER, SEPT., 1952

Now You Can Weld Easier and Faster

THESE 5 G-E FEATURES TO HELP YOU



Generous overtravel makes accurate current settings easy.

1. **SMOOTH, FAST WELDS** are simple to make with the steady arc because arc-stabilizing capacitors eliminate popouts.
2. **ACCURATE CURRENT SETTINGS** are easy to make, especially in the low current range.
3. **OPERATING COST IS REDUCED** because less power is used when idling.
4. **INSTANT STARTING** without scratching saves operator's time. The hotstart automatically provides the right amount of starting boost for every setting.
5. **LONG COIL LIFE** is assured with Class H silicone insulation, exclusive with G.E.

TO GET YOUR SHARE of these big welding benefits, call or see your nearest authorized G-E welding distributor! His name is listed in the yellow pages of your telephone directory. Look for General Electric under "Welding Equipment."

Section F711-24, General Electric Company, Schenectady 5, N. Y.

Please send me immediately information on a typical G-E a-c welder, GEC-750.

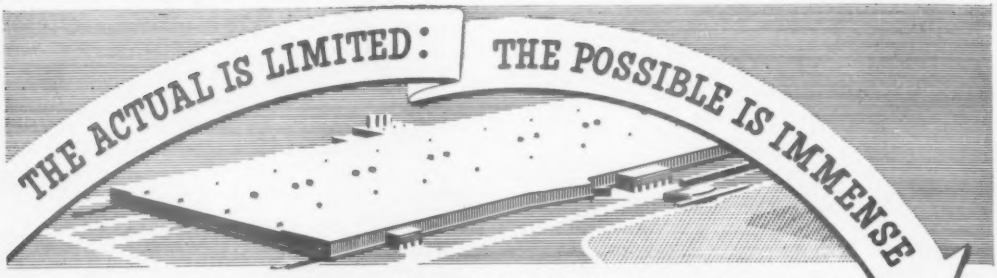
Name .....

Company .....

Address .....

City ..... **State** .....

GENERAL ELECTRIC



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1952

WELDED DESIGN INCREASES RIGIDITY WITHOUT INCREASING COST

By **Eric Hartmann,** Experimental Research Engineer
The Porter Cable Machine Co., Syracuse, New York

BY changing over the design of our belt platen support to welded steel construction, we have cut deflection over 90%. The former cast construction, (Fig. 1) would deflect from .017" to .020" under 400 pound table pressure. The present welded steel design deflects only .0015" to .002" . . . 10% of its original value.

Since steel is 2½ times more rigid than gray iron, it was possible to develop a more efficient product design on the platen itself without changing the basic dimensions of the machine or without increasing costs. On machine tools like ours, rigidity is basically important as it directly affects ultimate accuracy and efficient operation of the equipment.

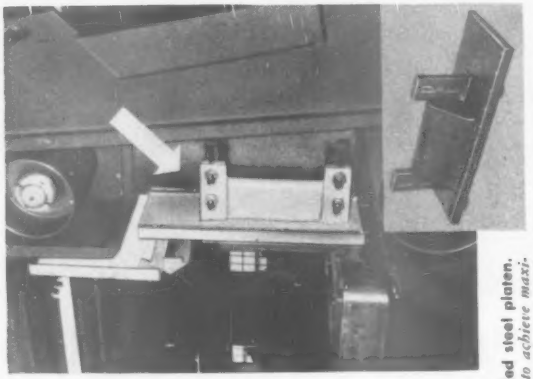


Fig. 3—Detail of Column *on Porter Cable BG-8 Grinder. Shows assembly of belt platen support governing the ultimate accuracy and efficiency of the machine.*

Inset: Rear view of welded steel platen. *Shows efficient use of steel to achieve maximum strength and rigidity per pound of metal.*

WELDED DESIGN ALWAYS SAVES STEEL AND LOWERS COST

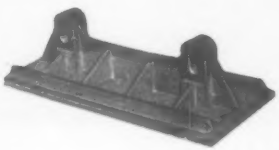


Fig. 1—Former Design— *Belt platen support for grinder was originally a casting. Required machining operations to finish the front face and the mounting arms.*

Fig. 2—Present Design in Welded Steel— *Is simpler to fabricate than the original construction. Components are pre-machined prior to welded assembly to simplify manufacture.*

HERE'S HOW

Machine Design Sheets free on request. Designers and Engineers write on your letterhead to Dept. 79,

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

ESTABLISHED 1916 THE WELDING ENGINEER SEPTEMBER, 1952

One Hundred Years of Engineering

SEPTEMBER is a big month for engineers. The Centennial Anniversary of the first engineering society is being held in Chicago this month. One hundred years ago, in 1852, the American Society of Civil Engineers was formed to provide an organization where engineers might meet together and share the results of their work.

The term "civil engineer" had an entirely different connotation in 1852 than it does today. Then the term was used to differentiate the work of the civilian engineer from the military engineer. There were no other classifications of engineering.

Today we have electrical engineers, chemical engineers, mechanical engineers, mining and metallurgical engineers, petroleum engineers, ceramics engineers, electronics engineers, communications engineers, aeronautical engineers, automotive engineers, industrial engineers, architectural engineers, agricultural engineers and welding engineers. There are even beginning to be atomic (or perhaps nucleonic) engineers.

Unfortunately, the vital part that engineers have played in producing our national prosperity and our high standard of living is too little understood. Like doctors, engineers do not advertise their achievements for ethical reasons. Unlike doctors, however, they are not employed by the general public. The public rarely sees an engineer and has only a vague idea of what they are and do.

The term "scientist" generally calls up a picture of a bearded man with heavy horn-rimmed glasses wearing a white coat. No such simple mental image exists for the engineer. The man in the street may think of him as a surveyor in high boots, the driver of a locomotive or perhaps even the janitor of an apartment house. No wonder the public is confused!

SEPTEMBER is also important to engineers because it is the month when engineering colleges begin their fall term. From a single engineering school back in 1824, there has been a continual expansion of engineering education until today there are 143 accredited engineering colleges in this country for men and women.

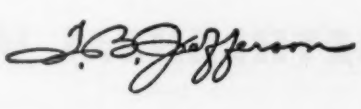
There has, unfortunately, been a dropping off of college engineering enrollment in recent years because of an erroneous report issued by the Department of Labor. In March, 1950, this government agency said that there were too many engineers. It has since reversed itself, convinced that there can never be enough engineers, but the harm has been done. It is tragic that a statement doing so much damage to a great profession should be made through the carelessness of government officials.

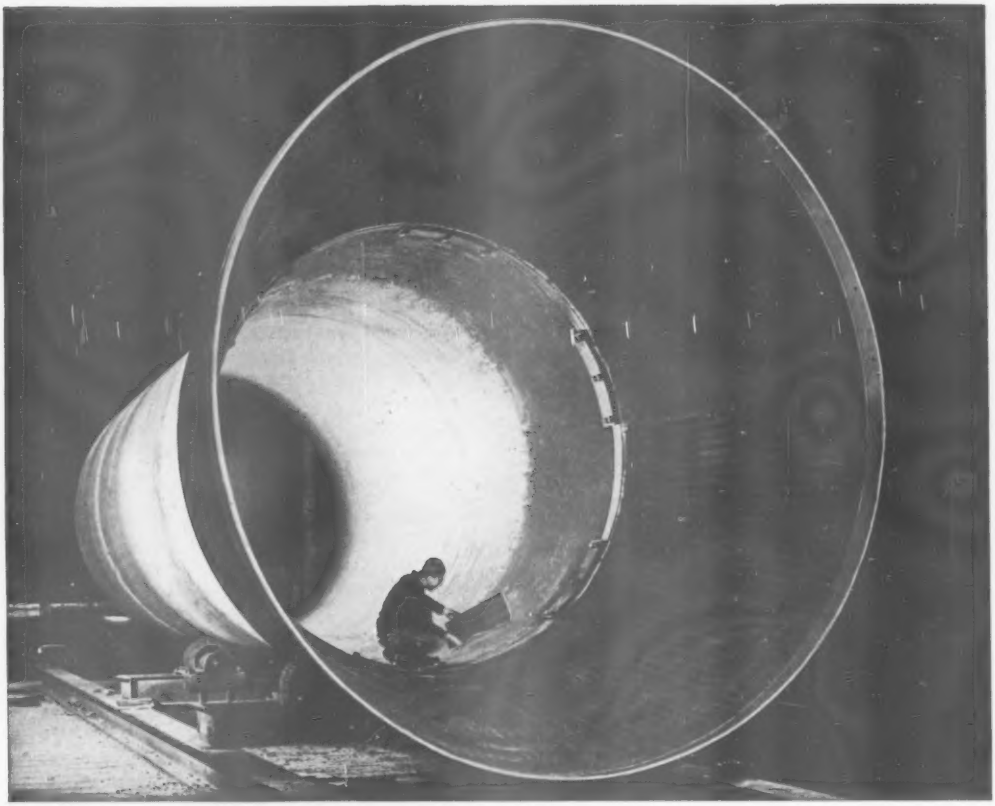
ENGINEERING is the hallmark of American endeavor. Touch anything around you, and you touch the work of engineers. The home or apartment in which you live, the water you drink, the plant where you earn your daily pay, the public transportation that carries you daily to work, the power plant providing heat and light, your auto, your telephone, your radio or television set—all are the work of engineers.

The engineers of America represent less than one-half of 1% of our population, yet they are the foundation for all of its progress. Every major scientific discovery or invention is developed by engineers—either to found an entirely new industry or to add a large new segment to an already existing one. Television, for example, was created because of the work of engineers in that field. If atomic fission is ever channeled from its present destructive purpose to useful and constructive channels, it will be engineers who do the job. If rockets fly to the moon, it will be engineers who build them.

In most industrial fields today, the welding engineer is playing an increasingly important role. Without welding, the progress made in television could not have been achieved. Neither would large-scale atomic fission have been possible. Whatever the future may bring to us, outside of the utter destruction of civilization and a return to the stone age, we may be sure that welding will be in demand. Students who are starting to learn the profession of engineering should not overlook this field.

It is fitting that we pause this month to pay tribute to the men who work in engineering. May they get the public recognition they richly deserve.





Kiln Section Made by Welding

This is a repair section for a rotary kiln. It consists of these three elements: (1) a cone, 9 ft, 6 in. long, formed from 1¼-in. steel plate; (2) a riding ring, 6 ft long, formed from 2½-in. plate, and (3) three shells, 21 ft, 6 in. long, formed from ¾-in. plate. The maximum diameter of the cone is 15 ft. The diameter of the riding ring and shells is 11 ft, 6 in. The complete assembly, weighing 76,467 lb, was produced by welding.

Kiln sections may be far removed from the type of equipment used in your business. But whatever the type of machinery you build, you'll find it worth while to look into the advantages of Bethlehem Weldments.

With Bethlehem Weldments, excess weight is eliminated, without any sacrifice of rigidity. This weight-reduction also represents a saving in the cost of the finished machine.

Bethlehem Weldments are extremely versatile, too. They can be produced as simple parts or intricate assemblies, and in practically any size. They permit freedom of design, for the steel from which they are made can be bent, pressed or shaped prior to welding, without damage to the physical structure of the steel. What's more, Bethlehem Weldments can be used either alone, or combined with forgings or castings.

If you would like to discuss the possibility of using Bethlehem Weldments, contact the nearest Bethlehem office and we will arrange for a representative to call.

BETHLEHEM STEEL COMPANY

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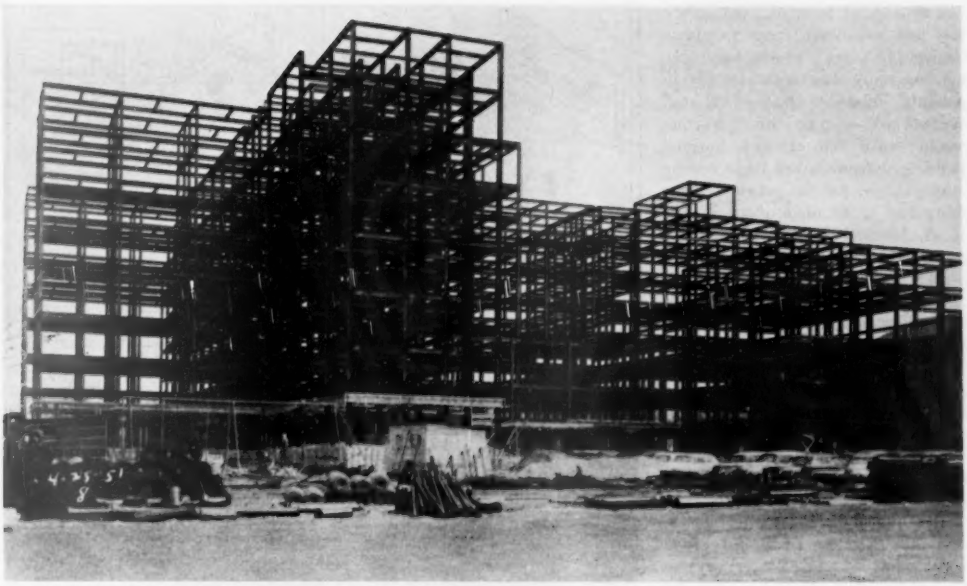
BETHLEHEM WELDMENTS

BETHLEHEM STEEL



1–WELDED framework of ten-story building for V.A. Hospital in Minneapolis. Steel is completely erected

SAVED: 341 Tons of Steel – I

Welded construction saves money and makes possible a better building. It also saves steel. For proof of it, just look at the figures given below.

Table I

Saving in Steel Auxiliaries

Weight of auxiliary steel in riveted job	180.0		tons
Weight of rivets	75.0		tons
Weight of Saxe clips		10.0	tons
Weight of welding electrodes		11.0	tons
Totals	255.0	21.0	tons
Saving		234.0	tons

Saving in Steel by Continuity Design

Weight of riveted steel beams	1,265.0		tons
Weight of welded steel beams		1,153.0	tons
Weight of stiffeners for continuity		5.0	tons
Totals	1,265.0	1,158.0	tons
Saving		107.0	tons
Total saving		341.0	tons

Table II. Savings in Shipping, Unloading and Sorting

Weight of steel for riveted job (less rivets)	2,242	tons
Weight of steel for welded job (less welding rod)	1,968	tons
Saving in weight of steel handled	274	tons

BY COL. R. A. PHELPS

WELDING will produce a better structure than either riveting or bolting, at a substantial saving in cost, and give other benefits as an added bonus. This was proved beyond a doubt in a recent building for the Veterans' Administration Hospital in Minneapolis (Fig. 1). Though hampered by many adverse conditions, the use of welds in lieu of rivets resulted in a better building at a saving to the government of several thousand dollars.

This ten-story, tier-type building was originally designed by the V. A. Construction Service for a fully riveted structural steel framework. Bids were taken, and the contract for the general construction was awarded to the lowest bidder, the J. D. Hedin Construction Co., Washington, D. C. Excavation was completed, and pile driving for the footings was in progress before the medical staff of the hospital became alarmed.

RIVETING WOULD BE NOISY

This building is an addition to an existing hospital. The site selected

was directly in front of (and only a few feet removed) from the main clinical building, which was then housing more than 350 critically ill patients. Belatedly, the medical staff realized that soon the din of riveting would make the existing hospital building untenable. But there was no other place to put the patients. Something had to be done about it. The V. A. Medical Service appealed to the V. A. Construction Service for a solution.

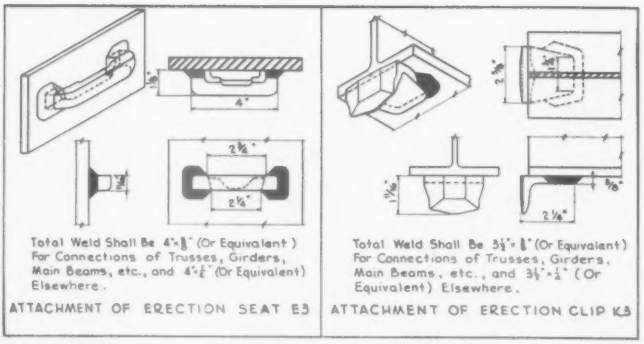
Construction Service, as is true of all government construction agencies, has the reputation of being ultraconservative. Never had it designed or built a welded steel structure. In this emergency, however, it departed from precedent and authorized the general contractor to secure revised plans for a completely welded framework.

The subcontract for the fabrication and erection of the steel had been awarded to the American Bridge Co. This company used the services of Saylor and Greeves, Inc., Detroit structural designing firm, for the redesign. As it was decided to use the Saxe erection clip for securing the steel in place prior to welding, the designer of this clip, Van Rensselaer P. Saxe, consulting engineer of Baltimore, was retained as consultant.

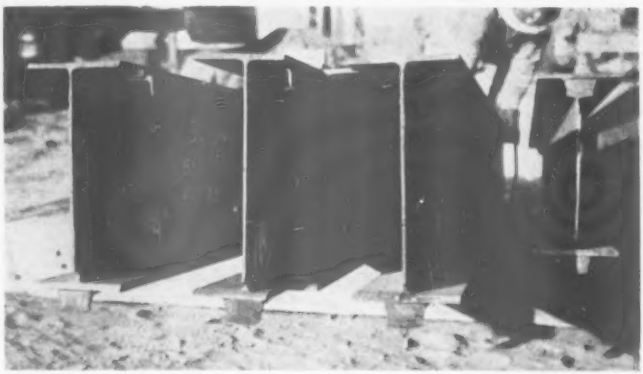
The redesign was in a rush, but all plans had to be checked by the V. A. Construction Service, returned for necessary corrections and then rechecked. This took up time. To expedite the starting of the construction work, partial and unfinished plans were sent to the American Bridge Company's fabrication shop in Minneapolis. These preliminary plans gave only the information necessary for the fabrication of the structural members and did not contain details of the stiffener plates required in continuity design. All of the steel was fabricated without any of these auxiliaries being attached in the shop.

How Welding Saves Steel

A welded structural steel framework is rigid and acts as a single unit, not as an assembly of separate pieces tied together with plates, angles and rivets. Stresses in the welded framework are transferred directly from member to member.


Total Weld Shall Be 4"×⅜" (Or Equivalent) For Connections of Trusses, Girders, Main Beams, etc., and 4"×¼" (Or Equivalent) Elsewhere.
ATTACHMENT OF ERECTION SEAT E3
Total Weld Shall Be 3½"×⅜" (Or Equivalent) For Connections of Trusses, Girders, Main Beams, etc., and 3½"×¼" (Or Equivalent) Elsewhere.
ATTACHMENT OF ERECTION CLIP K3

2—DETAILS of the erection clips and seats used to hold beams in place



4—POSITION of clips on the end of beams. Clips and seats were shop welded into their places before the members were shipped to the job site

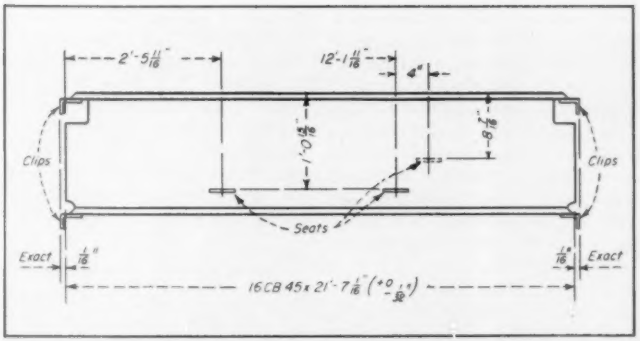
This basic engineering principle allows two large savings in steel tonnage.

Table I shows the total savings made possible by welded construction. The first saving is in the weight of plates, angles and rivets. The second saving is in the weight of the floor beams allowed because of continuity design. Beams placed end to end in the same horizontal plane and passing over a number of column supports can be designed as one continuous beam. Stresses are transmitted over the supports, allowing each beam to assist its neighbors. Hence a reduction in the weight of the beams can be effected. This cannot be done in a riveted or bolted framework, where the beam connections are not rigid. In the latter case, each beam must be designed to carry all of the stresses that may be placed on it.

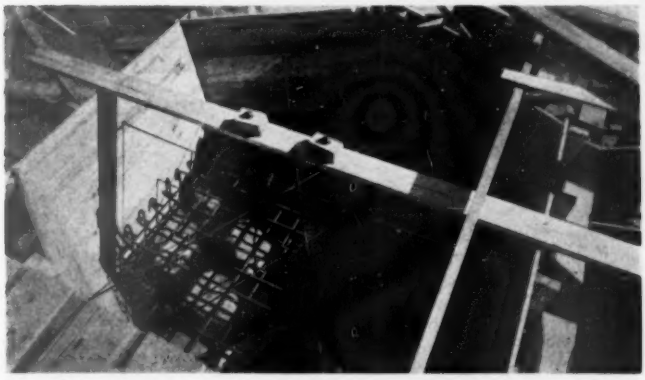
To obtain the saving in total cost allowed by the saving in steel, as shown in Table I, there must be no increase in labor costs. The erection must be a simple process. This means the steel must be exactly positioned when placed by the erectors, the framework must be self-supporting and rigid before welding and the members must be properly aligned to allow a complete and perfect weld.

It is the writer's opinion that the Saxe system of connection units is the nearest complete answer to this problem. The units used on this job were the K3 erection clip and the E3 erection seat (Fig. 2).

The clip is a forged steel prong that is fitted into a forged U-shaped seat. The clips are welded to the member to be supported, and the seat to the supporting member. In this job, clips were placed on the top and bottom flanges at each end of heavier beams. For lighter beams, only one clip at each end was used—placed



3—SKETCH shows the location of clips and seats. Note close tolerances



5—FOUND unsatisfactory for welded structural steel work were anchor bolts suspended from a 2-in. timber that is supported on a pile cap form

on either the top or bottom flange as desired. For special framing, clips were welded to the web or to auxiliary plates.

The seats were welded to the supporting columns for the main floor beams and to these beams for the intermediate beams. The seats were so located that when the clip was fully inserted the supported member was in exact position as to both line and grade.

The clips extended 1/16 in. beyond the end of the beam. This held the members apart the correct distance for welding. A lug on the clip locked under the seat when the clip was fully inserted. This prevented the beams from being displaced by vibration or jar.

After the crews were trained, the erection of the steel was as fast as the erection of riveted work. One gain in time was that on the beam connections no construction bolts or pins were used that would have to be removed later.

No Background of Experience

This was the first all-welded, tier-type building fabricated or erected by the Chicago division of the American Bridge Co. It was also the first building of its type erected in the north central states. Only one man employed in either the fabrication shop or on the job had had previous experience with the Saxe erection clip or had worked on a tier-type welded building. Therefore all fabrication, erection and welding techniques had to be developed as the work progressed, which added materially to the cost of the job. What was learned on this building, however, ought to make the next one cost less to construct.

In the fabricating shop, new techniques had to be worked out and men retrained. Men skilled in shearing, punching and riveting were retrained in the new procedure. The principal training needed was in the exercise of greater care to obtain the necessary accuracy. The tolerances allowed in the fabrication of riveted steel are quite liberal. The field erectors can adjust for inaccuracies by shifting splice plates, reaming holes and shimming. For welding, however, especially when using the Saxe clip, there are practically no tolerances allowed in fabrication.

A shop drawing (Fig. 3) was made for each member, giving dimensions to 1/16 in. Some dimensions also carried an added notation, "exact." On the overall length of all members, the plus tolerance allowed was 0 in., the minus tolerance 1/32 in.

On a riveted job, the column sections are cut and the ends milled to an exact length. The beams, however, are ordered by length from the mill as the tolerances allowed on mill-run steel can be compensated for in the placing of the connector plates or angles. For welding, the fabricating shop cut and milled all members—beams or columns—to exact length.

From the milling machines, the members passed directly to the welding benches. Here each piece was carefully laid out by means of templates and then rechecked. The necessary blocking out for clip clearances was made, and edges were beveled where required by cutting torches. The location of clips and seats were marked and carefully checked. These were welded in place, after which the entire piece was again checked. It was then marked for identification and was ready for shipment to the job site.

Positions of clips on the end of beams are shown in Fig. 4. The bottom clip is usually centered for connection to either flange or web of column. The top clip is usually centered when the beam joins into the column flange. When the beam joins into the column web, the top clip is usually placed on the side of the beam with the seat on the inside of the column flange.

Although more time was needed for cutting, milling and checking, a substantial saving in labor was made in the fabrication shop as it was not necessary to handle the heavy mem-

bers in and out of the punch presses. A still greater saving was made in the time that would have been needed to cut, punch and rivet the many angles and plates required for riveted work. Also, as there was an overall saving of more than 300 tons of steel, handling costs were reduced proportionally.

Making full allowance for the time required to set up for the new procedure, to retrain employees and for added inspection, there was a saving in shop labor cost of at least 15%. In a shop fully organized and equipped for welding fabrication, this saving in labor costs would approximate 25% of that required for riveted fabrication.

In shipping, unloading and sorting, a saving was made due to the lesser tonnage handled. This is shown in Table II.

On this job, an additional saving in handling cost was made by the use of a specially built straddle truck. The steel was sorted as it was unloaded from freight cars and placed on heavy wooden pallets. The truck would then straddle the pallet load, pick up pallet and steel and rapidly transport the load to the job site. Here the pallet load would be placed in position for easy pick-up by the erection crane.

Setting of Base Plates

One of the prime requisites for a successful welded structural steel job is accuracy in the setting of anchor bolts and base plates. This was learned the hard way. The anchor bolts were cast in concrete pile caps. These were carefully set to line and grade and were supported in the usual manner by suspending them from a 2-in. timber spanning and secured to the pile cap form. During the process of pouring and vibrating the concrete, there was some movement of the forms, which displaced many of the bolts.

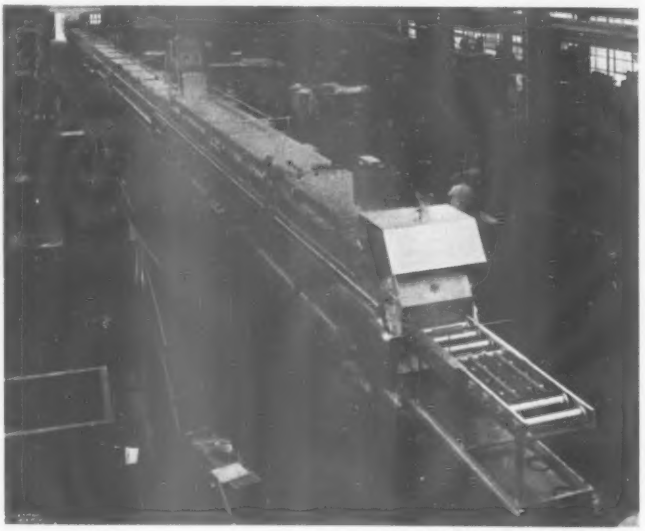
Figure 5 shows anchor bolts suspened from a 2-in. timber. This was found to be unsatisfactory for welded structural steel work. It is recommended that anchor bolts be suspended from 4-in. timbers supported independently of the concrete forms and runways. The realignment of these bolts after the concrete has been poured costs more than the separate supports. The need for greater accuracy in setting these bolts for a welded job is due to the fact that no adjustment for base errors can be made in the steel superstructure.

The base plates must also be carefully aligned and leveled at exact grade. It is recommended that the base plates be furnished separated from the columns to facilitate setting. The following method for setting the base plates was found to be most satisfactory:

Wire centerlines were placed on the column centerlines in both directions. The top of one anchor bolt for each column was graded with an instrument, and the distance down the top of the plate was marked in a prominent location on the concrete. Prick-punch marks were placed on the center lines of the plate at the outside edge. With this preparation, the plates were set, aligned and leveled at exact grade by the steelworkers using only plumb bobs and hand levels. Several crews could work at the same time.

Colonel Phelps' detailed discussion of the Minneapolis Veterans' Administration Hospital addition will be continued in future issues of The Welding Engineer. *Part II will cover the steel erection and welding, and Part III will present a comparison of welding and riveting costs for structural steel construction.*

7,000 Studs on This Furnace

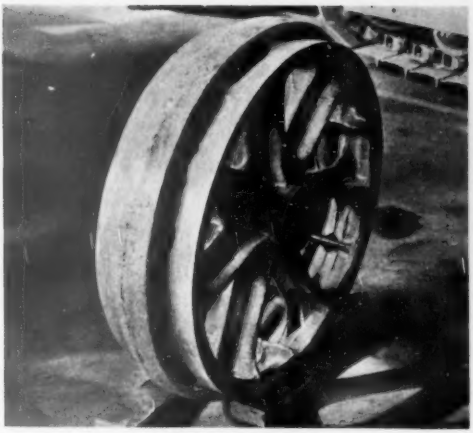


Nelson Stud Welding Photo

FURNACE pictured above is 191 ft long and has 200 rollers to convey pressed steel parts through a brazing process for an auto manufacturer

Lindberg Engineering Co., Chicago, saves more than 1,250 manhours a year by using stud welding in the assembly of its industrial furnaces, according to L. C. Koenig, works manager. The stud-welding method eliminates drilling, tapping and hand welding.

More than 7,000 standard flux-filled studs were used on the 191-ft-long furnace pictured above, which was manufactured by Lindberg for a large automotive manufacturer to use in brazing operations. Of the total number of studs, more than 5,000 threaded studs were needed to secure the cover plates for access and clean-out doors. These were all $\frac{3}{8}$ in. by $\frac{3}{4}$ in. threaded studs. To secure each of the rollers on which the pressed steel parts are conveyed through the brazing process, eight $\frac{1}{2}$ by 1 in. studs were used; since there are 200 rollers, this called for a total of 1,600 studs. The remaining studs ($\frac{3}{8}$ in. by $\frac{1}{2}$ in.) were to hold cover plates over the electric heating element connections.



1—ALMOST too late for repair. This tractor idler was worn completely through the rim in several places

2—HOLES in the idler were patched and wearing surfaces hard-faced by automatic submerged-arc process

Keeping Big Equipment in Service -- III

Welding for Maintenance

WHEREVER men work with machines and metal, welding is being used for the maintenance of equipment. In more remote areas, particularly, welding is indispensable to maintenance men who are forced to work with materials on hand when replacements are not available.

It is the purpose of this series of articles to show some of the ways in which welding helps to keep big equipment in service. In our June, 1952, issue, Mr. Jefferson discussed dredge pump maintenance, a field in which he is a recognized expert. In August, he dealt with the maintenance of shovel teeth and tractor grouser plates.

The present installment takes up the reclamation of large wearing surfaces on tractor and other parts to which the methods of automatic hard-facing may be applied. This most recent development in the field of equipment maintenance is becoming especially popular for the building up of cylindrical surfaces.

BY T. B. JEFFERSON

THERE is more than $10,000,000,000 worth of earth-moving equipment in operation, so it is scarcely surprising that more than $50,000,000 was spent in 1951 for the maintenance welding of these heavy-duty machines.

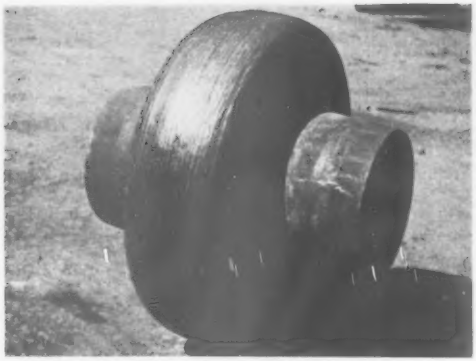
Long ago it was proved that welded equipment was the only type that was sufficiently rugged to withstand the rigors of earth-moving operations. For this reason, all major manufacturers of earth-moving equipment have turned to welded construction. But while welded construction has overcome structural frailties, it does not prevent deterioration through wear.

Earth-moving equipment is subjected to five types of wear: abrasion, corrosion, erosion, galling and impact. Abrasion is the grinding action caused by abrasive solids sliding, rolling and rubbing against the surface of wearing metal. Corrosion is the result of oxidation or other chemical reaction to which metal parts are subjected by the action of liquids and heat. Erosion is the scouring action on the wearing surface caused by liquids, vapors and gases traveling at high velocities. Galling is the temporary adhesion or sticking together of local areas of two bearing surfaces, followed by the tearing out of small fragments when the surfaces pull apart. Impact is the effect of blows, either light or heavy, which tend to deform the surface of the wearing metal and result in its cracking and chipping.

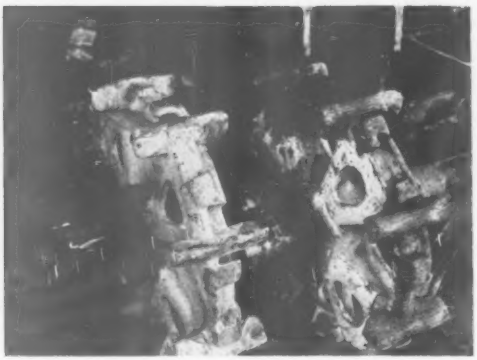
Every moving part is subject to one or more of these types of wear, depending upon its locations and exposure to abrasive materials.

Abrasion Biggest Problem

Abrasion, impact and galling are the most common causes of wear in earth-moving equipment; abrasion presents possibly the greatest problem. Practically every moving and exposed part on earth-moving equipment is subjected to abrasive wear. If dirt can get to it, there's abrasion. Some parts such as the teeth of a shovel, ripper or rooter or a grader blade are specially made for abrasive action. Other parts, however, may be subjected to abrasive action only because of their locations: for example,



3—AUTOMATIC submerged-arc hard-facing is ideal on cylindrical surfaces such as found on this shovel roll



4—COMPARE the worn crawler shovel drive sprocket on the left with its reclaimed companion at the right

Keeping big equipment in service . . .

the partly submerged rails and rollers of a crawler tractor when it traverses sand, mud or other abrasive material. Oftentimes, a dust-laden atmosphere provides an abrasive grinding compound that wears away rotating parts, particularly lubricated parts (to which dust can stick) that operate at a relatively high speed. In the case of a grader blade or the tooth of a shovel, impact combines with abrasion to wear away the part rapidly.

Hard-facing materials offer the best solution to the problem of overcoming the five types of wear common to earth-moving equipment. It is necessary, though, to know how to select the proper type of hard-facing and how to apply it properly. The correct procedure for application is most important.

Where the part has a large wearing surface, either long and flat or else cylindrical, automatic hard-facing may be used effectively. The inherent advantages of automatic hard-facing closely parallel the advantages offered by automatic arc welding. The big advantage is that the deposit may be laid in a series of continuous stringer beads. Automatic operation means that: (1) hard-facing is continuous; (2) stub end loss is eliminated; (3) deposits are uniform; (4) the speed of deposition is higher; (5) there is a uniform arc, which (6) results in a smoother deposit and a better surface appearance.

Automatic hard-facing has been most widely used in the building up of cylindrical surfaces such as tractor rollers and idler wheels and similar items on crawler-type draglines, shovels and cranes.

Tractor Idlers

Figure 1 pictures a badly worn tractor idler. It has been worn to such an extent that there are several long holes in the rim. Normally, it would seem desirable to discard this part. However, the continued shortage of steel, caused by the loss of more than 47,865,000 tons of steel production through strikes since the end of World War II, makes it advisable to salvage idlers even when they are as badly worn as this one. Money can be saved, however, if salvage is undertaken at an earlier stage.

The preparation of the idler, or in fact any part for hard-facing, is extremely important. All oil should be removed from the area to be hard-faced as well as from the surrounding surface, or a porous deposit will result. Likewise, the base metal should be free of rust. Rust can be removed successfully with a motor-driven portable wire brush.

The next stage in reclaiming a tractor idler worn as badly as the one pictured in Fig. 1 is to plug the holes in the rim. This is done by laying a piece of mild steel across each hole and fusing it in place. Each hole is filled in this manner with weld patches made from the inside. Not until then is the idler placed on the automatic welder.

Several overlays of hard-facing are needed. To minimize defects, it is generally recommended that large cylindrical surfaces be preheated to 600-700 F. No preheat is necessary, however, where the base metal is less than ½ in thick. A chrome-moly-vanadium hard-facing alloy is used in the form of a 5/32-in. wire. The hard-facing is deposited at about 30 ipm with a current of 400 amps at 32 volts. The results of these applications may be seen in Fig. 2.

Hints and Cautions

It has been found that the deposit of hard-facing alloy is much sounder and the bead easier to control if the manufacturer's recommended amperage is maintained. In most instances, this means a lower current setting than is generally recommended for submerged-arc welding.

Both distortion and surface checking may be generally reduced to a minimum by preheating. Usually a preheat temperature of 400 F is sufficient. In some instances preheat temperatures as high as 700 F are employed: high preheats, though sometimes desirable, often lead to difficulties in flux removal.

The first pass of an automatic hard-facing deposit is generally diluted to a rather high degree by the base metal—even more so than the first pass in manual welding. For this reason, a second pass is necessary; perhaps even more passes are needed to assure a hard metal overlay with desirable properties.

If you will look again at Fig. 2, you will see that the beads are quite uniform, as is the contour of the deposited material. The bead contour will vary with the current setting,

5—WORN pockets (right) are returned to size by inserting shim (center) and welding it into place (left)

6—ROOTER frame is repaired by welding, as indispensable as hard-facing to maintenance of heavy equipment

speed of rotation and the extent to which the deposit is made ahead of dead center. The slower the speed of rotation, the wider the bead. Conversely, the bead becomes narrower and higher as the speed of rotation is increased.

The higher the amperage setting, the longer the deposited metal will remain molten. A long molten condition allows the center portion of the bead to "peak." By adjusting the amperage of the electrode lead distance ahead of dead center), the contour of the deposit can be properly controlled.

The soundness of the deposit (which has a great deal to do with its wearing qualities) will depend to a considerable extent upon the lap of adjacent beads. Where successive beads overlap, the deposit is much smoother and requires less machining or grinding to produce a finished surface.

The only limitation for the automatic hard-facing of cylindrical surfaces is the diameter of the part. It has been found that parts smaller in diameter than 5 or 6 in. cannot be successfully hard-faced by automatic submerged-arc methods because of their tendency to overheat. The overheating so fuses the flux that it becomes almost impossible to remove as the welding progresses.

The shovel roller pictured in Fig. 3 is another interesting example of a part built up by automatic hard-facing with the submerged-arc process. This part was reclaimed with the same chrome-moly-vanadium electrode material mentioned in connection with the tractor idler reclamation. It was subject to the same limitations and difficulties.

Manual Arc Welding

While automatic welding is becoming increasingly popular in the reclamation of earth-moving equipment, it has not yet replaced the manual arc. Figure 4 pictures two drive sprockets from a large power shovel. The crawler drive sprocket on the left illustrates the manner in which the part has been worn because of abrasive action. In this case, the abrasion was due wholly to the material in which the sprockets worked. The companion sprocket on the right has been reclaimed by hard-facing, using the manual arc method.

The teeth and pads of the sprocket were rebuilt by deposits from an E-7016 electrode. This alloy steel provides a tough and uniform foundation for subsequent hard-facing overlays.

Because the sprocket was to be hard-faced, the alloy-steel deposit was finished off within 3/16 in. of the desired tooth size. The tooth was then built up to its finished size by depositing a number of parallel stringer beads. The hard-facing in this instance was a self-hardening ferrous material with chrome-manganese alloying agents.

Tractor Drive Sprockets

Tractor drive sprockets can likewise be reclaimed by depositing weld metal and hard-facing. One contractor simplifies the job by merely welding in an insert.

Figure 5, picturing a tractor sprocket, shows three of the track rail link pockets. A worn pocket is on the extreme right (arrow). The wear is quite severe and reclamation would present a problem by conventional methods of rebuilding. Under the circumstances, however, this extreme wear simplified the problem of doing the repair job. It was only necessary to fill the worn pocket with an insert and weld the insert in place.

In the center of the picture (arrow) is the insert—a steel shim cut from a piece of 3½-in. steel pipe. A 3-in. nipple of pipe can be cut in two to provide a pair of shims. At the extreme left of Fig. 5 (arrow), we see the manner in which the insert was welded to the drive sprocket.

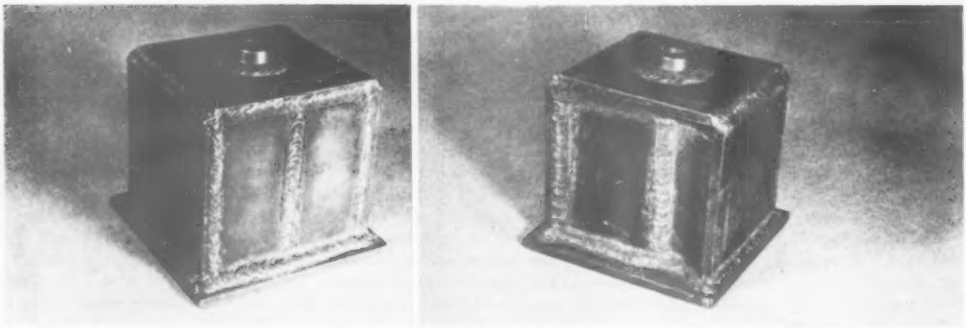
While this method of repair is quite successful, some contractors attempt to obtain even greater service from the tractor drive sprockets by hard-facing the welded inserts. There is difference of opinion as to whether or not such applications are necessary. Unless wear is extreme, there is not sufficient room for hard-facing.

While hard-facing plays an important role in the maintenance of earth-moving equipment, welding is indispensable to repair broken parts. Figure 6 pictures the repair of a non-wearing part—the frame of a rooter.

Proved over the years to be a money-saving, time-saving way of keeping earth-moving equipment in operation, maintenance welding is becoming increasingly popular, and more and more ingenious applications are coming to light every day.

TANKS and pressure vessels need weldors who can be relied upon for watertight welds. How do you get them?

How to Find Pressuretight



1–FRONT and back of the test box designed to separate the wheat from the chaff. It looks simple to weld, but—

BY EARL H. McCATHRON

The McCathron Boiler Works Co., Bridgeport, Conn.

IN A GLORIFIED job shop, where there are seldom two jobs the same, you must have weldors who know how to weld almost anything. Despite our 48 years in the business (and the fact that we are operating a fairly large shop), we still cannot have all of our weldors under constant supervision. We must have men that we can rely upon, men who can assemble their work from blueprints and weld it in a manner such as to make the welds watertight. The watertight requirement is necessary for us as a major portion of our work is in the building of tanks and pressure vessels. It is not uncommon for our shop to turn out a tank for a hydraulic system which is subjected to pressures up to 3,000 psi.

MANY WILL BLUFF

Like most welding shops, when we want additional weldors we either take it up with employment agencies or insert ads in the local newspapers. In either case, we state very clearly the type of weldor wanted as well as the work we want him for. The Bridgeport area has many good structural shops which train good weldors. The fact that a man is a good structural weldor, however, does not necessarily make him a good pressure vessel weldor.

We have found that about 90% of those answering our ads will state on their application that they can do everything that we want them to do. We have learned not to take their word for it. When these "all-around" applicants were put to work in the shop without testing, some sad experiences would result. In self defense, we have developed a quick test to check a man's ability.

Figure 1 pictures the finished test box we are now requiring our new weldors to put together before we take them on. When a fellow comes into the shop seeking work, we give him eight pieces of steel and a special steel nipple together with a blueprint (Fig. 2). We tell him at the beginning that the type of man who can put this box together and weld it so it will be leakproof is the type of man we want.

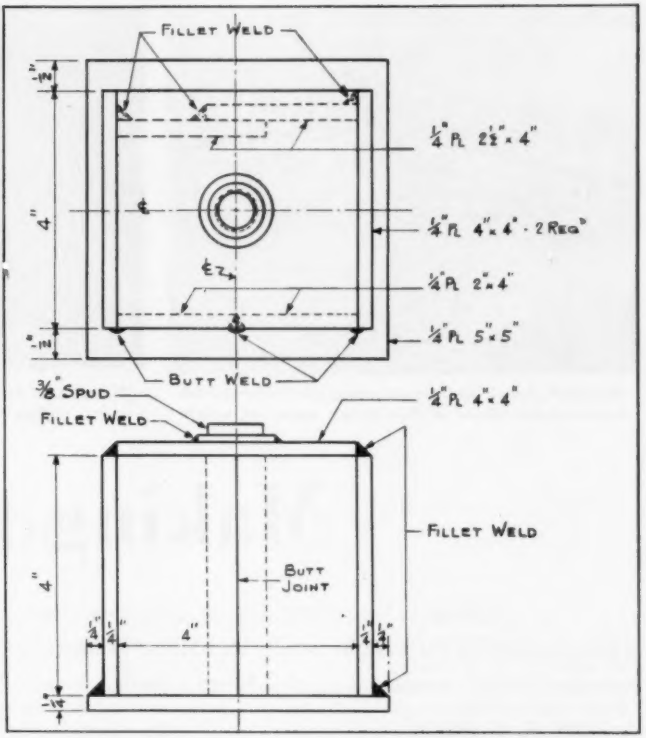
"WHEN a fellow comes into our shop seeking work, we give him eight pieces of steel and a special steel nipple together with a blueprint (reproduced at the right). We tell him at the beginning that the type of man who can put this box together and weld it so it will be leakproof is the type we want.

"He (the prospective weldor) is asked to assemble the pieces and weld them according to the sketch. This specimen gives the worker an opportunity to make butt and fillet welds and will give a good idea of his ability as a weldor. The box (Figure 1) is tricky to put together for one not familiar with it."

Weldors

This specimen gives the worker an opportunity to make butt and fillet welds and will give us a good idea of his ability as a weldor. The box is tricky to put together for one who is not familiar with it, but the instructions are clearly detailed on the blueprint. If the applicant can read a blueprint, he should have no difficulty. He can weld the box together in any position he desires, and there are no requirements set as to size of electrode or machine amperage. Everything not on the blueprint is left up to the man's individual judgment.

About 85% of those who take the test do all their welding in a flat position. Usually, it takes from 45 minutes to an hour for the average weldor to assemble the box and weld it. The fellows who have been bluffing may fool around with it for an hour or an hour and a half, then quietly walk off when the superintendent is not looking, leaving the job unfinished.



2—IF WELDOR knows how to read blueprints, he should have no difficulty in following this sketch. All the instructions are clearly detailed

Sprinkler Head Performance

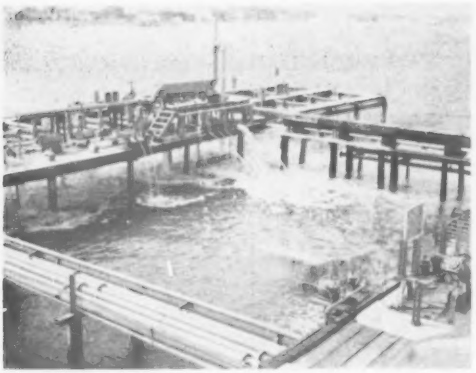
About 50% to 60% of the weldors taking this test fail, primarily because they don't know how to make a pressuretight weld. We consider up to three leaks in the box about the maximum for a good weldor. However, we will pass a weldor with as many as six or eight leaks. Leaks usually occur at points where the weldor starts and finishes beads. The box is tested, incidentally, with only city water pressure.

It is interesting to watch the faces of the applicants, especially those who have never done watertight work, when the box is tested. They are amazed when they see their beautifully welded box turn out to look like a sprinkler head. We, of course, know that these men have never done any watertight work. In the case of the bad leaks, the applicant generally admits (looking rather sheepish) that he was not too experienced and was trying to see if he could get away with it. Occasionally, even an old hand at structural steel welding will admit that he never knew his welds could be so porous.

About 40% of the fellows who fail either can't put the box together at all or put it together incorrectly. This is because they can't read blueprints. We have found that the man who puts the box together in accordance with the drawing and in a neat manner usually makes good welds. We have never had any weldor assert that the test is unfair.

Sometimes an applicant is able to put the box together in a most satisfactory manner, but his welds are leakers. Occasionally, we take an applicant of this type and train him further in welding. During the training period, he generally proves out satisfactory as an assembler and tacker.

We do not say that a test like this is a cure-all for the employment problems of all fabricating plants, but it certainly fits excellently into the activities of a job shop like ours. Such a test would not be necessary in a business where a man does the same thing day after day, for it is easy to train him in the skills required. Such a shop, however, might develop a test that fits their particular program, just as we have developed this little box to fit ours.



WOODEN trough and piping system at Harbor Island test corrosive effects of flowing sea water on metals

MONEL roof being welded by oxyacetylene torches. Inert-arc welding couldn't be used because of the wind

Making the Ocean

Effects of sea spray, sea air and immersion are being studied for various metals and alloys at marine corrosion testing stations along the North Carolina coast.

BY H. C. PHELPS

WHAT ARE the effects of the corrosive action caused by sea spray, salt air or immersion in oceanic water upon different metals and alloys (and upon the welds in them)? The answers to such questions are being studied at three marine testing stations operated by The International Nickel Co., Inc. These stations, which turn the ocean into a giant test tube for predicting the behavior of metals, are located at Harbor Island and Kure Beach on the North Carolina coast. Collectively, they are referred to as the "Sea Horse Institute."

Many Beliefs Found Wrong

The Institute's well equipped laboratories have confirmed many accepted beliefs about corrosion, but, at the same time, have proved many beliefs to be wrong. Other interesting discoveries about corrosion and behavior of materials under corrosive conditions are being made. For example, tests demonstrate:

1. That all too frequently different metals when placed together will create an anode and a cathode, resulting in galvanic corrosion. The more noble metal of the two will outlast the other many times over, depending upon their relative areas.

2. That where metals are used in combination, they should be close to each other in the galvanic series . . . dissimilar metals should be separated as far apart as possible.

3. That when dissimilar metals well apart in the galvanic series are joined, brazed joints should be used instead of threaded connections.

4. That combinations of metals should be avoided in which the area of the less noble metal is smaller.

5. That dissimilar metals should be insulated from one another whenever possible or practicable and coatings should be applied with caution.

6. That pieces of bare zinc or steel placed next to many metals subject to galvanic corrosion help to counteract the action.

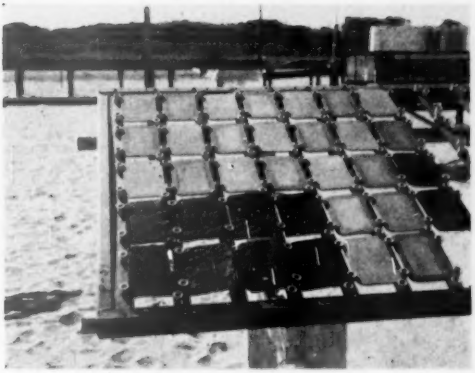
What Are Noble Metals?

The above facts may require a word or two of explanation. In the galvanic series, the corroded end (anodic) is referred to as the least noble; the protected end (cathodic) is called the most noble. Magnesium is at the corroded end of the series, platinum at the protected or most noble end. In between (in order from less noble to more noble) will be found*:

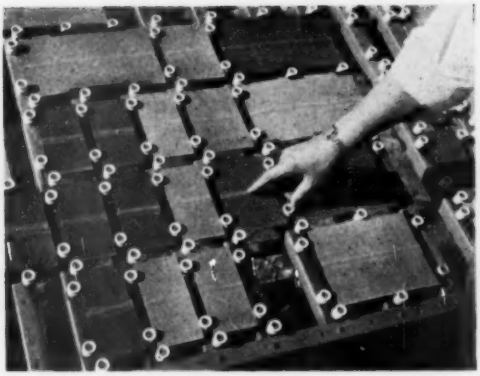
Zinc
Aluminum
Steel
Cast iron
Chromium-iron (active)
18-8 stainless (active)
Lead
Tin
Nickel (active)
Inconel (active)
Brasses
Coppers
Bronzes
Copper-nickel alloys
Monel
Nickel (passive)
Inconel (passive)
Chromium-iron (passive)
18-8 stainless (passive)
Silver
Gold

Another interesting discovery made here is that many metals last longer when placed in the sunlight than when under cover or in semiprotected areas. An example is the wire

*Additional metals and alloys listed in The Welding Engineer's Engineering Data Sheet No. 50 (November, 1944).



CONDITION of samples shows what salt air can do to some metals. A master record of each sample is kept



ON SOME welded samples, the welds show pitting. On others, it is the metal next to weld that is pitted

a Test Tube

screen shown in one of the accompanying pictures.

Both Harbor Island, located between the mainland and Wrightsville Beach, and Kure Beach have a great many advantages for the type of testing done. There is an abundant, continuous supply of full-strength sea water, uncontaminated by sewage, industrial wastes, oils, films or other pollution that interferes with tests in harbors or near big cities. The ocean at Harbor Island has a varied temperature of from 45 F to 85 F and several good months for growth of a large variety of marine organisms.

Testing at Harbor Island

The marine corrosion testing station was first established at Kure Beach in 1935 under the direction of F. L. LaQue, in charge of corrosion engineering for International Nickel. Later atmospheric and sea spray testing facilities were added at Kure Beach. In 1951, the marine testing station was moved to Harbor Island. H. T. Paterson is resident manager of the station, and a staff of 11 employees is maintained to conduct tests on all kinds of metals, alloys, nonmetallics (wood and plastics), paints, finishes and other preservatives and coatings, even rope.

The marine testing station is well protected from the pounding and destruction of high waves from the ocean. A fluctuation in water level with the rising and falling of tides permits the study of the effects of water line and intermittent immersion. A large pontoon float is used when a constant depth of water line is required.

The station has facilities for pumping 7,000,000 gallons of salt water per day, equivalent to the daily fresh water requirements of the city of Wilmington, N. C., a dozen miles away. Additional facilities are a boiler plant for furnishing up to 4,000 lb of steam per hour at a pressure of 125 psi, a modern machine shop, chemical laboratory, photographic laboratory, equipment for arc welding, inert-arc welding and oxyacetylene welding, a full-sized salt water evaporator and distillation unit.

Tests are being conducted on the piling, under the dock, in the buildings, on the beach, inland and even on the roof of the main laboratory building; the tests include water jets, polarization, erosion, spray, velocity and evaporators. Conducted on the docks are immersion tests for samples of cable, timbers, piling, a model heat exchanger and chlorinating facilities.

At the time of the writer's visit, testing was being done for 24 hours a day on a low-pressure steam evaporator for the U. S. Navy. If these tests prove that fresh water can be made from salt water at the rate of 1,000 gallons per day by using low-pressure steam, a great many of the Navy's troubles with condensers and boilers can be overcome. Tests are also being run on a 300-gallon-per-day evaporator.

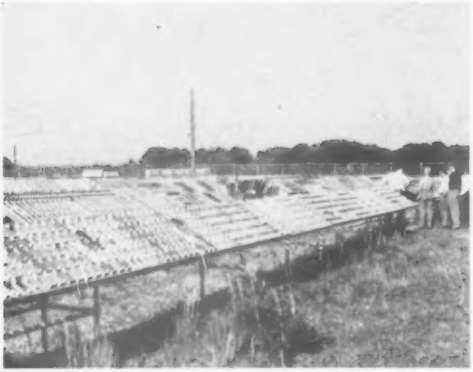
Welded Pipe under Test

In the yard at Harbor Island is a maze of pipes, fittings and valves made of all sizes and metals that have been brazed, welded and threaded together. This piping is under various pressures up to 300 psi and has salt water running through it 24 hours a day. If a break or leak occurs, complete data are available concerning service life, pressure, location and flow of water per second.

Threaded pipe joints have been more subject to galvanic corrosion than brazed or welded joints, especially if dissimilar metals are used.

Erosion and corrosion are also being measured by many different methods. One is a rotating spindle that shows the effect of sea water on metal bars and tubes after they are whirled through violently agitated water at speeds up to 30 feet per second.

Other metals are cut into discs and placed on spindles with plastic spacers between them. The discs are then rotated at high speed in sea water.



INSULATORS and Monel screws hold specimens for air corrosion tests. Rack frameworks are of welded Monel

BELIEVE it or not, but it is the wire screen in the open (at top of rack) that has the longest life

Such a test specimen provides a speed gradient from center to outer circumference that reveals the velocity at which a protective film or coating will begin to peel away.

Another test is to mix sea water and air bubbles and shoot jets of the mixture against the surface of metal pieces under test. This reproduces service conditions for, say, condenser tubes that are subject to the water hitting them at high velocity.

As if sea water wasn't sufficiently corrosive by itself, chlorine is being added to it. Chlorine, however, helps to reduce the fouling of intake lines and the sliming of condenser tubes aboard ships. Its efficiency in this respect is being tested.

Immersion Tests

The water that flows through the various piping systems is discharged through valves into a three-lane wooden trough 600 feet long. This giant trough has automatically controlled flow for each lane. Along the bottom of the troughs (allowable depth 8 in.) are placed samples of metals and materials, which are periodically removed for visual inspection or physical testing.

Some metals remain in perfect condition as long as the salt water flows over them at certain rates of flow; if left in still water, they will erode away. Other metals gradually disappear when left where the water flows but will remain in perfect condition and free of corrosion in still water. The why of it all doesn't seem to be known.

The ocean is a living thing and not just a chemical mixture. When metals are lowered into the ocean to specified depths (two to seven feet), hundreds of organisms begin to grow on the samples. Some samples after removal from submersion in sea water are almost totally unrecognizable: cable has swollen to several times its normal size due to the coating of marine organic growth; unprotected wood is literally bored hollow by marine borers and ship worms. On metals, organic life will grow to thicknesses of six or more inches on the metal during a period of about six months.

Samples for submersion are lowered by overhead crane that travels on the usual steel track, and removal for inspection is a comparatively simple operation.

Laboratory tests conducted with man-made synthetic or reconstituted sea water are not satisfactory; the only way to get reliable results is with full strength sea water with attendant organisms.

Finding Galvanic Action

Still another method is used to test galvanic action in metals and alloys. The samples are placed in a hard rubber holder that holds them in the form of a narrow channel. Sea water is passed through this channel at speeds up to 15 feet per second. The potential (voltage) and current flow are measured to secure data on the polarization tendencies of metals in flowing sea water.

Corrosion has proved to be a natural electrochemical phenomenon, and tests are being carried out continuously to prove the most reliable guides to the best and proper selection of materials to withstand it.

Tests on Roof and Docks

The roof of a section of the main building is covered with Monel sheet 0.025 in. thick. Edge joints were made in the separate sections by turning up the edges $\frac{1}{2}$ in. and fusing the resulting flanges together with the oxyacetylene torch. The sheets had to be oxyacetylene welded. Because of the constant prevailing wind of 15 mph, inert-arc welding could not be used; the wind blew the inert gas away even when shield tents and shelters were erected.

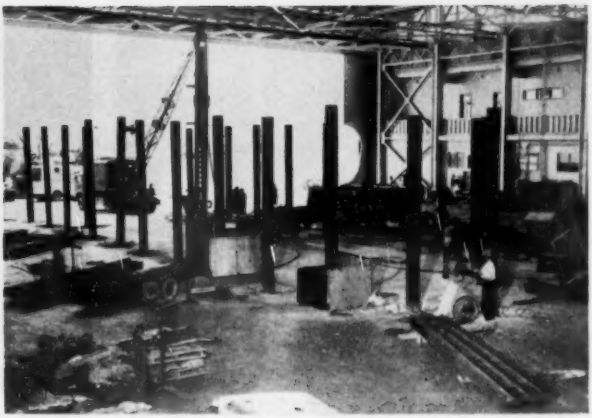
The roof provides a large surface for testing the corrosive effects of salt air. When the dock was constructed, provisions were made to use it as a testing ground also. Each wood piling has been given a different coating of preservative, and several steel pilings have been given different types of surface protection against corrosion. These include hot-dipped and sprayed metallic coatings and cupro-nickel and Monel sheathings that have been applied by several different methods such as integral cladding to welded and mechanically fastened coverings or wrappings.

Some piling is being given cathodic protection from current generated by magnesium anodes only.

The second testing station is at

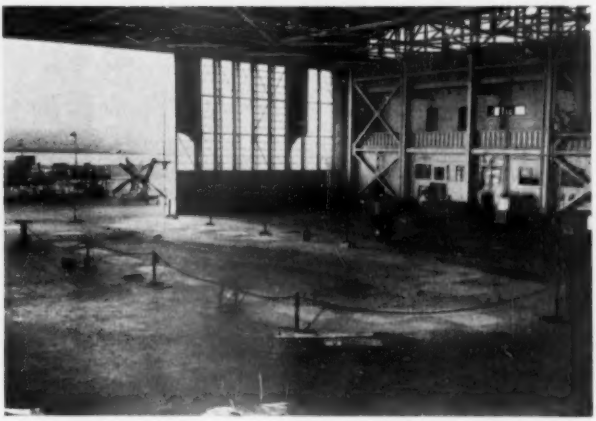
(Continued on page 48)

1—OPENING UP the floor. Reinforcing is bent back to allow opening for pile



2–PLACING the piles in one of the bays of the hangar. The 17-ft sections are lined up and waiting for the pile driver to start work

3–WELDING on new section. Note jig that holds the sections for tack welding



4—FINISHED bay: the piles have been driven and are covered by concrete patches (roped off), poured to replace the broken flooring

Indoor Pile Driving

How do you drive steel piles 65 to 116 feet long in a floor inside an aircraft hangar? Floor needs reinforcing badly, but the ceiling is only 34 feet high.

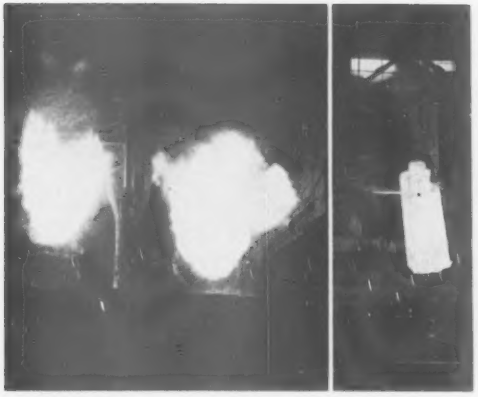
BY MARGARET RALSTON

WHEN Pan-American World Airways began doing maintenance work on Boeing "Stratoclippers" at the San Francisco International Airport hangar, the floor started to sink. This hangar was built over filled ground, and its floor foundation simply was not designed to support the weight of six Stratoclippers—435 tons of aircraft—at one time.

Study revealed that the fill under the 320 by 250 ft hangar had settled from a minimum of 6 in. to as much as 2½ ft. In one 50 by 70 ft bay, all of the piling had separated from the floor, which was left suspended in space and supported only by its reinforcing bars. The piling had been pulled away from the pile caps under a major portion of the floor.

A San Francisco firm of consulting engineers, Earl & Wright, was called in to make a survey to see what could be done to save the building. They recommended that the floor be immediately reinforced by driving in new piles at 10-ft intervals in that part of the hangar where the big Boeing cruisers would be parked and in the previously mentioned bay

(Continued on page 48)



BESSEMER converters produce the steel. Ingot (at right) is removed from soaking pit and put on rollers

BILLET, emerging from reheating furnace, is passed through a series of rolls to be thinned and elongated

From Ingots to Steel Pipes

Wheeling Steel Corp. takes pride in the fact that it controls production of its continuously welded steel pipe, literally, from the mine to the market.

CALLED a "miracle of modern engineering and production genius," the new "continuous weld" pipe mill at the Benwood Works of the Wheeling Steel Corp. turns out steel pipe of various sizes at speeds of from 450 to more than 1,000 ft per minute.

Production of the pipe in the big plant near Wheeling, West Va., starts with raw iron. Molten iron from the nearby blast furnaces is charged into Bessemer converters, which oxidize by atmospheric oxygen practically all silicon, manganese and carbon. After eight minutes of blowing, the resulting low-carbon steel is poured into a giant ladle, where additions are made to control its quality, and is then teemed into ingot molds.

From Ingot to Skelp

The ingots are stripped from their molds and placed to soak in a natural-gas-fired pit. After an ingot has soaked (at a temperature of 2,300 F) to a uniform rolling heat, it is lifted from the soaking pit and placed on rollers to be carried to the blooming mill. An ingot measures 20 by 25 by 75 in. The blooming mill reduces it to a billet 1½ to 3 in. thick and approximately 150 ft long.

As the long, long billet emerges from the blooming mill, it is advanced on rollers to the shearing station to be cut into lengths of about 30 ft. At this station, it is also inspected for surface defects. Minor defects are removed by flame-scarfing.

The cut lengths of the billet go into a reheating furnace and are then passed through a continuous mill to be converted into skelp or strip. A series of ten horizontal roll stands and four sets of vertical rolls gradually reduce the thickness and increase the elongation. This mill assures a careful control of the width, thickness and edge condition of the skelp from which the pipe is formed.

Upon leaving the finishing rolls, the skelp is turned on edge and then passed through a coiling device. A 1,000-ft coil of skelp is made from a billet 30 ft long. Each coil is identified as to its metallurgical specifications and is checked for width and gage before it is transferred to the pipe mill.

First step in the actual making of the pipe is to pass the skelp through leveling rolls. These flatten the coiled strip so that it will travel without any kinking or bending. To provide an uninterrupted supply of skelp, the trailing end of each coil is welded to the leading end of the next coil in a flash-welding machine. The skelp is fed onto the floor, forming a huge loop (to provide slack for welding the ends of the coils together).

Continuous Pipe Mill

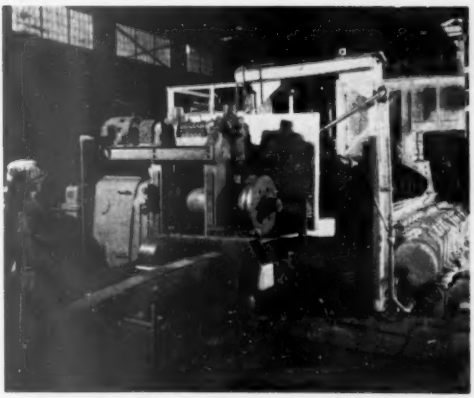
A completely synchronized motor-driven system provides the power for pulling the skelp through the integrated heating, forming and welding equipment. Speed is acurately controlled and held constant for the particular pipe being produced.

The skelp—thoroughly conditioned and welded into a continuous strip—enters the mill through a heating furnace 183 ft long. Hundreds of small gas burners on both sides of the furnace heat the edges of the strip to the required temperature for welding. It is important that heat be directed at the edges of the strip and away from the center, for the skelp must retain enough strength to withstand the tension caused by the mill rolls pulling the strip through the furnace.

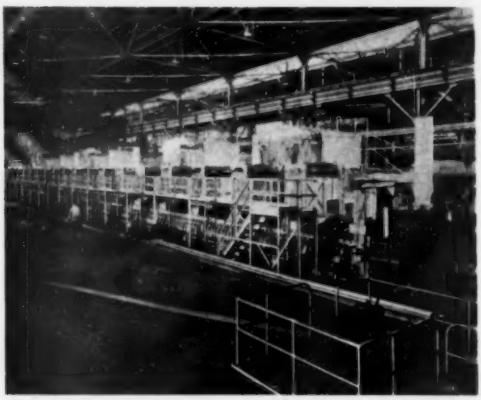
As the skelp leaves the furnace, the edges are just at the melting point and ready for the forming and welding operations. Wheeling's twelve-

FROM ROLLS, the skelp is passed through a coiling unit. The 1,000-ft coils are easy to store and handle

TO PROVIDE continuous skelp, the trailing end of each coil is flash welded to leading end of next coil



SKELP now enters a heating furnace 183 feet long. Hundreds of gas burners heat strip edges on both sides



CONTINUOUS mill forms pipe of various sizes at production speeds that range from 450 to over 1,000 fpm

stand mill consists of twelve pairs of grooved rolls arranged in six sets, each set including a pair of vertical and a pair of horizontal rolls.

Pipe Forge Welded

In passing the first set of mill rolls, the strip is bent downward and formed into a tubular shape. Now at the correct temperature for welding, the edges of the skelp are fused together by succeeding mill rolls, producing a perfectly tight bond by a forge-welding process. With each set of rolls moving at progressively higher speeds, the pipe is formed, welded and further reduced in diameter and elongated after welding. The post-weld drawing and reduction operations produce both a stronger weld and a pipe with greater ductility.

The finished pipe is cut by an adjustable "flying hot saw" to any desired length from 18 to 46½ ft. An electronic speed regulator keeps the saw carriage properly synchronized with pipe processing speed.

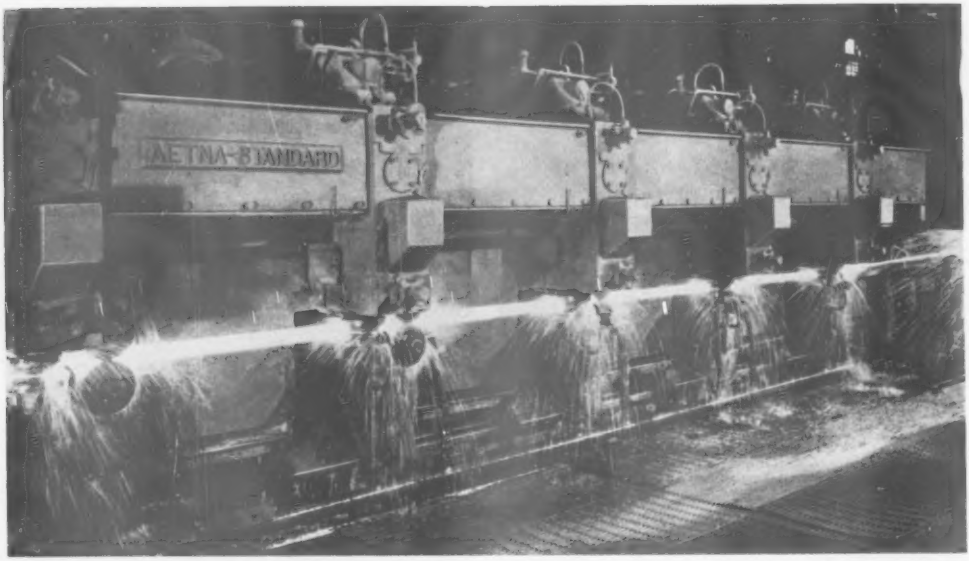
The cut lengths of pipe pass over automatically controlled conveyors and cooling racks to another mill stand for finish sizing. This is set to close tolerances to produce the exact diameter of pipe specified. Any scale on the pipe is completely removed in the final sizing operation.

A series of heated screws on a cooling rack helps to maintain the sized pipe in perfectly straight condition while it is cooling. Where necessary, additional straightening is done after inspection.

Each length of pipe is subjected to a hydrostatic test of 700 psi or more. Finishing operations are done as specified; *i. e.*, beveling and facing the ends, threading and attaching couplings, etc. Finally, the pipe lengths receive a protective coating of lacquer before they leave the Benwood Works.

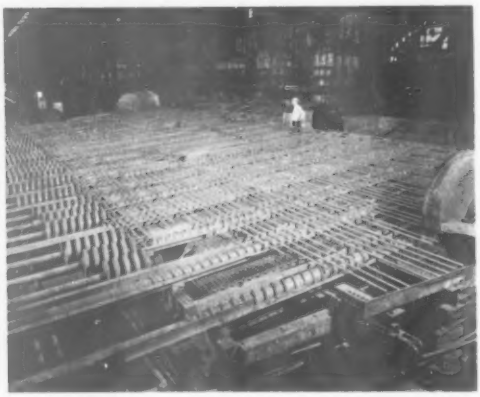
A slightly different treatment is given pipe that is to be galvanized. After final sizing and testing, this pipe is immersed in successive tanks of acid and caustic soda to remove all scale, cinder and oils. Only a thoroughly clean surface can assure the

Turn page to see how the pipe is welded



EDGES of skelp are at the melting point as it leaves the furnace. Mill rolls form strip into tubular shape and press the edges together. Heat and pressure effect the weld—just as a blacksmith used to do on his forge

"FLYING" hot saw cuts the finished pipe to length at a speed properly synchronized with mill processing



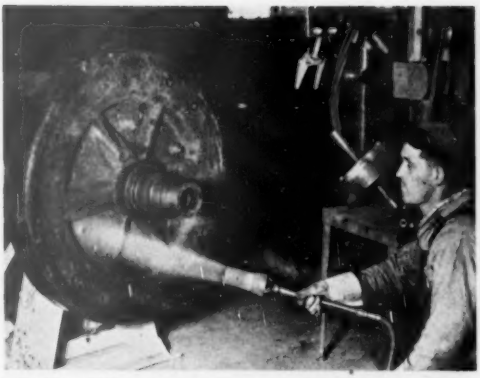
HOT SCREWS straighten sized pipe on cooling rack; pipe is kept straightened all the while it's cooling

necessary tight bond between the steel and zinc. The acid-and-alkali-cleaned pipe is rinsed, fluxed and fed mechanically to galvanizing pots, where it is submerged in a molten zinc bath. The excess zinc is removed from both inside and outside of the pipe, producing a smooth, clean finish.

The Wheeling Steel Corp. takes a justifiable pride in its history, takes pride in the fact that Benwood, just a mile south of Wheeling, is the birthplace of the modern steel pipe industry. It was here in the year 1888 that Francis J. Hearne, an iron master of old Wheeling, produced commercially the first steel pipe made on a production scale in the United States —for that matter in the world.

Ridiculed at first, Hearne's idea of steel pipe was adapted to steel made by the Bessemer process and soon revolutionized the industry. The operations pictured on this and preceding pages are supported by "mine to market" control of every essential raw material. Wheeling owns all of its sources of supply.

Under the critical eyes of the company's metallurgists, every step from the smelting of the iron ore to the rolling of the steel is carefully checked to assure highest quality of the finished product. Modern warehouse facilities, with sidings on the Pennsylvania and Baltimore & Ohio railroads, expedite the handling and shipping of pipe orders everywhere in the United States.



PREHEATING was done to attain an even temperature of 500 F—a temperature held all during the welding

PASSES were laid on until new metal ½-inch thick had been deposited. Skip method avoided heat warpage

Just a Repair? Or an Improvement?

$1,000 was saved. More importantly, the welded journal had many advantages over a new part

TO MOST people, a repair is a repair, and something repaired is quite like the same thing when new. It can, however, be significantly more.

Many different types of welding repair can be made that are not repairs at all. They represent a vast improvement over the old product.

Here is a good example:

Cargill, Inc., Savage, Minn., uses Anderson dryers in the processing of flax. These dryers are equipped with rotating cast-iron heads 54 in. in diameter, with a wall thickness of 1½ in. The heads are hollow: inside are tubes that provide outlets for the steam used to remove the moisture from the flax before the linseed oil is extracted.

The heads of the dryers rotate at approximately 100 rpm, and the journal wears out quite regularly, which allows the steam to escape around the packing gland. The journal is 6 in. in diameter and 14 in. long. So big a problem does its replacement present that company officials had always been of the opinion that a whole new dryer was the best replacement. The cost of a new dryer meant an outlay of $1,300 every time the journal wore down, which was held to be satisfactory.

Photos courtesy All-State Welding Alloys Co., Inc.

Conditions change, though, in this era of shortages. Several months ago, the point was reached when $1,300 would not produce a new dryer within a reasonable length of time. Something else had to be considered.

Company officials called in engineers of the Alloy Hardfacing Company, Minneapolis, for a recommendation on building up the worn journal. The journal was worn down nearly ½ in.—1 in. on the diameter—for the complete 14-in. length of the bearing surface.

Alloy Hardfacing engineers knew how to make a repair tailored to fit this particular job. They took into consideration these basic requirements:

No. 1. A low-melting-point alloy for build-up.

No. 2. An easy application, using available facilities.

No. 3. A free-machining alloy.

No. 4. A hard alloy that would withstand the weight of the dryer.

No. 5. An alloy to withstand the corrosive action of the contact with the live steam.

No. 6 (most important of all). The alloy had to have good frictional wearing properties.

The answer to all the metallurgical properties was a thick flowing nickel-silver brazing alloy that could be applied at 1,600 F with the oxyacetylene torch. This wire was 3/16-in. thick.

The dryer was securely placed in a rotating positioner. The area to be built up was thoroughly degreased and hand ground to bright metal. Next procedure was to cover the area to be brazed with a paste flux to keep it from oxidizing. Preheating was done over the whole dryer with portable propane torches to bring up the temperature to approximately 500 F; this temperature was maintained all during the actual welding.

A welding torch with a No. 40 drill size orifice was used, and four passes were made. Passes were laid in by the skip method to avoid heat

(Continued on page 48)

ELECTRONIC tubes and their related circuit components, though relatively complicated, will simplify production—particularly with automatic welding machines

DEFECTIVE spot welds may be made and production time lost if malfunctioning electronic tubes are not replaced. It costs little under most circumstances

Tips for Longer

BY THOMAS A. DICKINSON

ELECTRONIC tubes, most vital elements in the circuits of resistance-welding controls, can be used for as many as 500,000 hours each. But not if they are abused.

The average tube manufacturer guarantees his tubes to operate for only 1,000 hours because he doesn't want to be responsible for tubes that fail due to mistreatment. A tube with no integral defects can withstand even very severe usage for 1,000 hours.

As replacement parts, electronic tubes are not generally expensive. Yet a failure can be quite costly in terms of defective welds and lost production time. For example, it is estimated that Douglas Aircraft Co. is now saving more than $5,000 monthly because it has adopted maintenance methods that reduced tube failures by a margin of only 10%.

Furthermore, it should be noted that there have been (and may be again) circumstances in which electronic tubes could not be replaced at any price because of nationwide shortages of certain critical materials such as tungsten.

Damage in Shipment

The first step that should be taken to avoid tube failures is to make sure that each new tube is in good operating condition. Tube makers work hard to maintain high-quality standards, and there is no reason to believe that any tubes are defective at the time of shipment. But many things can happen to a delicate electronic tube before it reaches a consumer.

Rule No. 1: Check the condition of the carton in which a tube is received and look for loose or broken parts. Most of the damage that a tube can receive because of rough handling can be detected by this simple inspection. Special test instruments may be used to ascertain the presence or absence of less obvious defects. In shops that cannot afford such instruments, the maintenance man can be reasonably certain that a new tube is in good condition if it can be used in place of an identical tube, known to function properly without altering the performance of welding equipment. Preferably, the socket used in making the latter use-test should be heavily loaded.

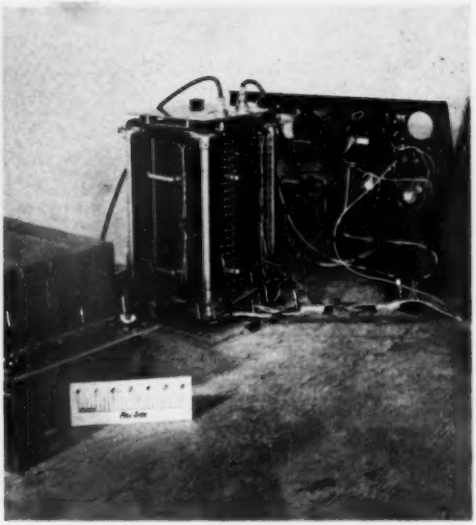
There is no reliable method of predicting the ultimate life of any individual tube in an electronic circuit, any more than there is of predicting the span of a human life. Both tubes and people vary. It has, however, been proved that the life of any tube is affected by the following factors:

(1) Filament voltage.
(2) Plate voltage, residual gases.
(3) Fatigue of metal parts.
(4) Heating and cooling cycles.
(5) Efficiency of cooling system.
(6) Efficiency of associated relays.

Tube Safety Devices

Virtually all types of modern welding equipment with electronic accessories have features designed to prevent the abuse of electronic tubes. These tube safety guards usually pro-

NUMBER of tubes that may be used in the control of welding equipment seems virtually unlimited. A properly maintained tube can function for 500,000 hours



SAFETY devices to prevent tube misuse include constant-voltage transformers and thermostatic controls. Though not perfect, they serve a worthwhile purpose

Tube Life

vide for: (1) the limitation of initial surge current when filament voltage is first applied, (2) the application of filament and plate voltages in the proper sequence, (3) the automatic self-regulation of filament voltage settings, (4) the removal of supply voltages whenever plate or grid current exceeds the allowable maximum and (5) the disconnection of supply voltages whenever plate cooling becomes inadequate.

However, it should be remembered that automatic protective devices are not perfect—even if could be safely assumed that each welding unit in current operation has all of the protective devices listed in the preceding paragraph. Here is an example:

Watch Filament Voltage

In the operation of recently developed three-phase welding machines, filament voltage is automatically controlled (within a 1% tolerance) by constant-voltage transformers. If, however, voltage settings and readings are not checked occasionally to assure the proper functioning of the filament transformers, there is an excellent possibility that vacuum tubes will eventually be damaged or ruined by too much filament voltage.

Incidentally, filament voltage is regarded by many authorities as the most important single factor involved in tube life. Among other things, say these experts, a majority of tube failures in older types of resistance-welding equipment has been the direct result of too much filament voltage—a condition that could have been avoided in most instances by frequently checking voltmeter indications and adjusting voltage settings as necessary for optimum performance.

Most electronic tubes can be satisfactorily operated with 5% or 10% less voltage than that indicated by tube manufacturers' technical data; when this is done, the life of a tube can be doubled or tripled because less voltage means less heat for the cathode or filament. All filaments will burn out eventually, but it can be delayed by not heating a filament any more than is absolutely necessary. Voltages exceeding tube manufacturers' recommendations by more than 5% will invariably shorten the life of a filament—sometimes to the extent of causing a tube to fail instantly.

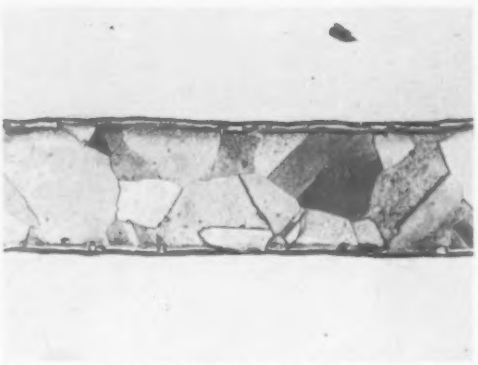
Mercury-vapor rectifier tubes (ignitrons) require some special precautions. When installed for the first time or when used after a long period in storage, they should be operated at rated filament voltage for at least 15 minutes before plate voltage is applied. This long warm-up is necessary to redistribute the mercury, which may be deposited on active elements of the tube. With an ignitron in normal use, a two-minute warm-up period should be sufficient. If the tube then appears to be unstable, flash-arcing can often be eliminated by temporarily operating the tube with lower plate voltage.

Cooling Most Important

Anode cooling is an especially important item in the operation of high-vacuum oscillator and rectifier tubes with high power ratings. Where provisions are made for the cooling of anodes with a forced flow of water or air, the system that circulates the coolant should be inspected daily to

(Continued on page 46)

1—SQUEEZED together with a 100,000-lb force, the copper and stainless sheets are welded at the edges



2—PHOTOMICROGRAPH of etched specimen reveals the copper core material between the stainless sheets

Hot "Sandwich" of

Rosslyn Metal is a new material of high heat conductivity that may boost jet-engine service life and performance. Here are the ways in which it can be welded.

IT'S HARD to conceive of two metals having any more dissimilar properties than copper and stainless steel. With their widely separated characteristics of melting point, tensile strength and hardness, it is obvious that their formation into a composite material would be difficult if not impossible. Nevertheless, metallurgists have demonstrated that lamellar sheets of stainless steel can be bonded to both sides of a copper core.

Called "Rosslyn Metal," this composite sheet material can be handled in production in much the same way that sheets of simon-pure stainless or Inconel are processed. It can be formed, welded, machined and spun without difficulty if special attention is paid to its particular characteristics.

From Pots to Jets

Rosslyn Metal was originally developed for deluxe cooking utensils. It proved so popular that the demand outran the supply. Now a war use has been found for it—to better the performance of jet engines.

To test the high-temperature behavior of Rosslyn Metal in jets, the development laboratories of Ryan Aeronautical Co., San Diego, are building combustion chambers, afterburner vanes and exhaust headers of the new clad material. If it lives up to its metallurgical forecast, "RM" may well provide more speed, lessened fuel consumption and longer life for jet power plants.

Rosslyn Metal is fabricated in the Carnegie, Pa., plant of American Clad Metals Co., the developer of this product. Squeezed together with a force of 100,000 lb, the sheets of copper and stainless steel are welded at the edges to "seal" the sandwich (Fig. 1). In Figure 2, the photomicrograph of an etched sample shows how the copper core material looks between two sheets of stainless steel. The magnification (in the original 8 by 10 in. photo) was 200 X.

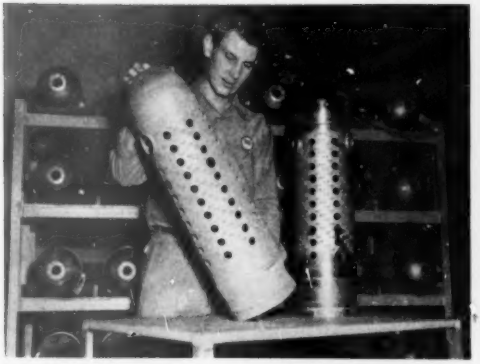
Blending the heat-conducting characteristics of copper with the exceptional strength and durability of stainless steel, Rosslyn Metal is said to have the highest thermal conductivity of any heat-resisting material. Under some conditions of service, the laminated sheets actually have greater lateral conductivity than pure copper. Even at temperatures of 1,500 F. lateral conductivity compares favorably to that of pure copper—which would, of course, oxidize to destruction if exposed directly to such heat.

Taking the heat conductivity of copper as 100%, Rosslyn Metal has a comparative thermal conductivity of 57.2%. At the moment that heat penetrates any point of the thin stainless-steel outer walls, the copper core quickly and uniformly conducts it throughout the entire sheet. "Hot spots" are avoided because the heat penetrates the thin stainless-steel sheet in a matter of a second and the copper immediately spreads it over a distance of at least 1,000 times the thickness of the cladding material.

Spot and Seam Welding

Rosslyn Metal can be satisfactorily spot and seam welded with the techniques and equipment ordinarily used for welding solid stainless steel. Generally, either the electrode pressure or the current or both must be increased over the settings normally used for welding solid stainless steel.

In a typical application, type 347 Rosslyn Metal, 0.030 in. thick, was spot welded to solid stainless steel, type 302-18, 0.060-in. thick. Minimum single-spot shear strength established by Army and Navy specifications for materials with ultimate tensile strength of 90,000 psi was easily obtained. A 50% penetration into the Rosslyn Metal and 80%



3—STANDARD (right) and Rosslyn Metal combustion chambers will get high-temperature performance tests

4—TO PROTECT an afterburner rake against high temperature, a shell of Rosslyn Metal is installed

Copper and Stainless

penetration into the solid stainless sheet was shown with nuggets 0.150 in. in diameter.

Tips for Arc Welding

In an arc-welded butt joint, the type of electrode used must be designed to give a weld-metal analysis that will provide strength, ductility and corrosion resistance equal to the parent metal. Ordinary 18-8 stainless steel can absorb 4% of copper in solution without harmful effect on its corrosion resistance or its ductility. The welding procedure must minimize the copper pick-up so as to hold it within safe limits. Due to its high heat conductivity, the copper in Rosslyn Metal has little tendency to melt down in the weld puddle. The heat is carried away from the weld puddle at such a rapid rate that the stainless molten metal casts itself against the copper with a minimum of fusion.

A wider gap between the sections to be welded is advisable to permit the arc to fuse the bottom layer of the stainless without having to melt through the copper. Beveling of the edges to be welded for a 90-deg included angle will help prevent excessive copper pick-up. When the proper gap between the pieces to be welded is prepared, the bottom layer of stainless can be fused and the metal frozen with a chill bar beneath the joint. The molten metal will then fill up the gap in the copper layer and a minimum copper pick-up will be encountered because of the chilling effect of the copper on the molten metal in the welding puddle. The top layer of the stainless will then be fused because of the relatively poor conductivity of the stainless and its tendency to fuse into the weld puddle.

Current use should be accurately controlled, and the voltage-amperage characteristics should be the minimum that will give proper fusion. A very short arc should be used, and the polarity should be reverse, as in welding solid stainless steel. The use of 3/32-in. or smaller d-c coated electrodes is recommended.

A high nickel-bearing rod should be used, such as Inconel or an 80% nickel-20% chromium, regardless of the type of Rossyln Metal being welded. With high nickel content, the copper pick-up has less effect than it does with the lower nickel alloys.

In all gages, the edge to be welded should be beveled so as to simplify the welding of the bottom stainless. Beveling may be omitted if a 100% joint is not required and if the material can be welded from both sides. With Rosslyn Metal of heavy gage, it is advisable to make a multiple-pass weld. The first bead is designed to fuse the bottom layer of stainless. Then, the weld should be thoroughly cleaned before the next layer.

Rosslyn Metal is also readily welded by the inert-arc method. The set-up and the welding bevel are approximately the same as described above. As in metal-arc welding, the preferred technique on heavier materials is to use a multiple-pass weld with small filler rod and low heat instead of a one-pass weld with a larger filler rod and higher current.

Strength at High Temperature

Laboratory data show that the strength of RM sheet at temperatures up to 500 F is at least equivalent to that of a sheet of solid stainless steel having a thickness equal to the RM sheet less two-thirds the thickness of its copper core. For temperatures between 500-1,500 F, the two-thirds factor becomes one-half because Rosslyn Metal is relatively stronger at these higher temperatures. Thus, with RM with a standard 30% copper core, 85% of the total gage may be used in design at the rated strength of the cladding at temperatures between 500 and 1,500 F.

With these favorable factors, Rosslyn Metal may well become the next metallurgical step to better jet-engine performance. An increase of only 100 F in the operating temperature of a gas turbine would improve thermal efficiency as much as 30%. Such a boost in operation temperature may be made practical by Rosslyn Metal.

SLOPE of Mt. Hood, Ore., is the site of Timberline Lodge, resort widely acclaimed as a skiers' paradise

STARTING the 3.1-mile journey. Cars run from the 3,800-ft level to the 6,000-ft altitude of the Lodge

Tramway to

Welded "sky towers" carry the cables on which the two "Cloudliner" coaches journey up Mt. Hood. Towers are hinged to allow for 4 to 6 inches of sway.

BY HARRIET GEITHMANN

A-FRAME towers. This view shows both upper and lower sections, together with the horizontal braces

CLOSE-UP of a tower leg at the right shows the trunnion at base that permits the tower to sway

THE amazing "Skiway Cloudliner" tramway to Timberline Lodge on the southern slope of Mt. Hood traverses 3.1 miles from Government Camp at the 3,800-ft level to the Timberline Lodge terminus at 6,000 ft. Up and down, the two "Cloudliners" travel, carrying tourists, skiers and tobagganers with their gear. Price for a thrilling ride at treetop level is only $1.50 roundtrip.

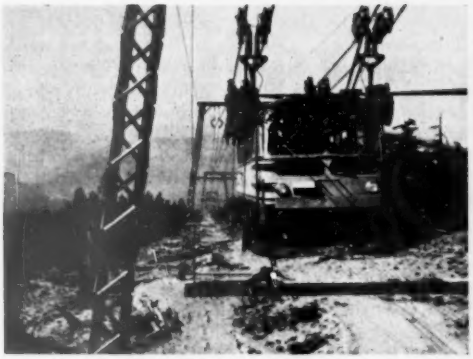
This aerial tramway is unique of its kind. There is no centralized power supply, no hoisting equipment at the terminals. The coaches travel on stationary cables that bear the weight but never move. Each of the two coaches is self-propelled by two 185-hp gasoline engines and is driven on four traction cables located below and parallel to the heavy cables that support the car's weight.

Both coaches are equipped with two sets of air brakes, which clamp down on the wheels with brake bands about an inch thick. If the pressure in the air tanks ever falls below 50 psi, the brakes automatically stop the coaches. In addition, there is also an auxiliary hand brake. Should a Cloudliner become stranded in the air, there is a block-and-tackle in the luggage rack and a bosn's chair in which passengers can be lowered one at a time to the land of conies and grazing deer just below.

Each Cloudliner carries 36 seated passengers and their skis and/or toboggans over a slope distance of 16,500 ft and lifts them a vertical distance of 2,300 ft.

Idea Came from Logging

The "Skiway" or tramway is in reality an adaptation of the Pointer-Willamette "skyhook" designed for logging operations in rugged mountain terrain. The skyhook is an overhead crane, powered by a motor mounted within it, which moves along two parallel wire ropes stretched between two guyed spars. In the conversion of a log handler to a passenger-carrying tramway, several additional factors had to be considered, chief of which were the payload to deadload ratio, heating of the coach, safe construction, visibility for the passengers, safety controls, etc.



JUST OFF the ground. The 36-passenger coach is supported by track cables, travels on traction cables

APPROACHING journey's end. Cable-carrying towers mostly range in height from 51 ft 7 in. to 71 ft 7 in.

the Clouds

The four-line cableway is composed of specially designed 1½-in. steel wire ropes (track ropes), which are fastened by U-bolts to jacks suspended from 20-ft crossbars mounted on welded steel uprights. The upright members and steel-beam crossbars together make up an A-frame tower. The tops of the A-frames are guyed together for the full 3.1 miles of tramway by 1-in. bridge strands fastened at each end of the crossbars. These strands are 2,000-ft long.

The A-frame towers are set in concrete abutments about 16 ft deep. Height of these "sky track" towers varies according to the location along the tramway, but most towers range between 51 ft 7 in. and 71 ft 7 in. The maximum design height is 81 ft, and the maximum span at the base is 35 ft 2 3/16 in. Center-to-center span at the top of the towers is 17 ft 3 in. The towers are separated by 600 ft of singing cables.

The spacing between the legs of the A-frame was determined by the length of the legs. The legs are inclined toward one another at an angle of 82½ deg with the horizontal.

Built in Three Sections

The tramway towers were built in three sections: base, lower section and upper section. The base is primarily an anchor for fastening the tower to the concrete piers. The lower section, the second item making up the tower, consists primarily of two welded laced columns, heights of which vary according to the allover height of the tower. The third item, the upper section, is uniform throughout the system.

In addition to these 29 A-frame towers, which hinge at the bottom, there are three similar but rigid towers along the tramway: two 45 ft 7 in. high and one 65 ft 7 in. high. There are also six end towers—three at each terminal of the tramway.

The base of the hinged A-frame tower is a rather heavy welded structure of two pieces, one for each tower leg. Each base section, weighing approximately 350 lb, is made up of 10-in., 15.3-lb channels, 4-in., 5.4-lb channels, 2 by 2 by ¼ in. angles and tubing of 6-in. OD and ½-in. wall thickness. The tubing was split to provide a heavy trunnion bearing. These various components were welded together with ¼-in. fillet welds at all points of intersection.

Lower sections are laced square columns varying in height according to location within a range between 11 f t 7 in. and 31 ft 7 in. Such wide variation in column height is necessary because the upper sections are of a constant height of 40 ft.

Sides of the square column have an outside measurement of 20 in. The four corner legs are 4 by 4 by ½ in. angles. The diagonal lacing, which runs in zigzag fashion up each side of the column, is formed from 2 by 2 by ¼ in. angles.

The entire A-frame structure is carried on trunnion tubes. Each of these was formed from a 36-in. length of tubing of 4¾-in. OD and ½-in. wall. The towers "float" on their pivots, allowing a sway of from 4 to 6 in.

All welds made on the lower sections of the towers were fillet welds. Fillets of ¼ in. were used on the diagonal bracing; ⅜-in. fillets on the tie plates carrying the angles; ½-in. fillets on the trunnion flanges.

To insure accurate spacing at the bottom legs of the A-frame, a pipe brace with pinned ends was constructed to the exact length required for each tower. This brace was made by welding two pieces of 6 by ½ in. bar stock to standard 6-in. pipe, using ¼-in. fillet welds.

Tower Upper Sections

The upper sections are uniform in every respect, having an overall height of 40 ft, a center-to-center distance across the top of 17 ft 3 in. and a center-to-center distance across the base of 28 ft 0 in. In the main, the upper section of the tower followed the same general characteristics of the lower section. The upright members were laced columns formed of four 4 by 4 by ½ in. corner angles, with 2 by 2 by ¼ in. angles for the lacing diagonals that zigzag up the column.

An upper brace was located 25 ft 9½ in. from the center of the top

beam. This brace, like the lower brace previously mentioned, was fabricated from 6-in. pipe.

The upper beam, which provides the support for the tramway, is a 20-ft length of 16-in. OD tubing with a ½-in. wall. To this big tube was affixed two sets of ¾-in. plates to form the pin connection for the hangers carrying the cableway. These plates, like everything else on the tower, were welded in place, the job requiring ⅜-in. intermittent fillet welds on both sides. A real test for a weld and an excellent evidence of the engineer's confidence in welding!

It is interesting to note that the principal contractor was the Pointer-Willamette Co., Inc., of Portland, a firm that has achieved a notable reputation for constructing aerial tramways for the logging industry of the Pacific northwest. Cost of designing and building the Mt. Hood tramway was about $750,000.

The stout-hearted engineers, who persisted in the face of almost insurmountable obstacles, included: Robert J. Cole, for 25 years with John A. Roebling's Sons Co.; Q. R. Coble, who toiled on the design of the Skiway, and Jack Harris, in charge of construction of the sky road. I. J. Howard, Walt Seil and W. S. Hood worked with Roebling's bridge division in the development of the aerial tramway from theory to finished Skiway. Phil Garbinski invented the skyhook. Owner of the Skiway is the Mt. Hood Aerial Transportation Co., officers of which are Dr. Otto George, president, and A. L. Greenwalt, treasurer and general manager. It should be noted that the transportation company took out insurance for a million dollars before the first construction began.

Problems of Logistics

The chief handicap that faced the contractor was to get his supplies and equipment into the field. The four 1½-in. track ropes, weighing about 72,000 lb each, had to be moved over 32 miles of state highway from the railhead at Maupin, Ore., to Timberline Lodge. A special permit was necessary, and Rudy Wilhelm had to devise a special hauling procedure to reduce axle loads. In addition, there was also the problem of erecting the track ropes. At Roebling's plant in Trenton, N. J., a machine was devised to apply a maximum load to the ropes in 1,000-ft sections. The prestretching has been satisfactory so far and the ropes have not stretched since their installation.

Besides the concrete blocks on which each A-frame is mounted, an extra-big block of concrete was poured at each terminal of the tramway to serve as a major anchor. The block at the upper terminal is 26 by 20 by 15 ft, composed of concrete made with crushed rock, and the anchor at the lower terminal is similar. The four 1½-in. track ropes are anchored to these blocks as are the four ⅞-in. traction ropes on which the coaches propel themselves along the track cables.

The 76 footings for the towers were subcontracted to Harold Lavelle, who used a tractor with shovel. One of the cuts was 17 ft deep and was dug from an opening 6½ ft wide, the width of the tractor. Mr. Lavelle also dug the two anchorages at top and bottom. Although the tractor worked longer than average hours and often moved boulders 12 to 15 ft in diameter, no breakdowns occurred during the three weeks that it took to do the job. No adjustments were needed for altitude, and there was no loss in power.

How Tramway Operates

Motive power of the coach is provided by two twin-coach motors mounted horizontally under the floor. These motors can be controlled from either end of the coach. The powered traction wheels are located in almost the same position as conventional running gear. Power is transmitted through a torque converter to the full reversible transmission that turns the driving axles.

The stationary traction ropes are picked up from a swinging wooden bar mounted on the A-frame tower. As the coach moves along the track ropes, the traction cable leads over a 24-in. sheave mounted on the top outside corner of the coach. Passing over this sheave, the rope goes down the side of the coach to the forward traction wheel, around this wheel to the rear traction wheel and around it. From the rear wheel, the rear cable is carried up to the top of the car and over another 24-in. sheave. Upon leaving this sheave, the rope goes back to a resting position on the holder on the support in the tower.

The cars are 35 ft long and weigh 20,000 lb when empty. They are suspended on the track ropes by sets of four wheels, one set mounted on each corner of the coach. Each set consists of four wheels mounted in pairs on separate walking bars, one paid to each of the two track ropes that pass over the corner of the coach.

A 30-ft counterweight tower from which two 7,600-lb weights are suspended, on a two-part take-up in each traction rope, provides a 40-ft take-up in each traction rope and delivers a 3,800-lb tension load to each traction rope. Constant tension is needed to give the driving wheels sufficient gripping power on the traction rope. The counterweight tower was built of two 12-in. I-beams with a 20-ft H-beam across the top.

The coaches were manufactured by the Pacific Car & Foundry Co., Seattle, Wash. They have standard fronts with full-width windshields. Bodies have all-welded, high-tensile steel frames covered with sheet aluminum.

LONGER TUBE LIFE

(Continued from page 41)

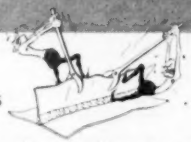
make sure it is functioning properly. Even if the tube has a thermostatic control, designed to prevent the flow of plate and filament current if the tube becomes too hot, the operations of thermostats can often be impaired by small particles of dirt or scale.

Is tap water being used to cool the tubes? Scale formation in the circulating system must be anticipated. The presence of such formations is usually heralded by a hissing noise (due to the localized boiling of water). If you hear such a hissing, the cooling system requires an immediate check-up.

No scale should occur where tubes are cooled with air or distilled water in an enclosed circulating system, but dust and other foreign matter on tubes can cause intermittent electrical contacts and localized heating effects. Clean tubes and related circuit elements once every week or two to avoid accumulations of dust. Compressed air or a vacuum line can be used to remove foreign matter from relatively inaccessible areas; larger and more accessible surfaces, such as the glass bulbs of tubes, should be polished with a clean rag.

Low Temperature EUTECTIC WELDING ALLOYS

stops mild steel welding failures

minimize stress  ...distortion ...warpage with Low Temperature EUTECTIC WELDING ALLOYS

impossible?...that's what the Stolper Steel Products Corporation thought, too, until they actually tried these **new,** entirely different EUTECTIC "Low Amp"® EutecTrodes.® Then they came up with the astounding Case History shown below...Yes, we not only **claim** this amazing performance...we **prove** that "Eutectic" is different...prove that these new alloys **solve** metal-joining problems **where conventional materials fail!**...Let us prove it in your shop...just as we have in over **78,000** other plants and shops throughout America...There's no cost, no obligation involved...just fill in and **mail** the coupon below for a **free** consultation-demonstration from one of our 350 trained District Engineers who stand ready to serve you from coast to coast.

AMERICA'S LEADING INSTITUTION
DEVOTED TO THE RESEARCH AND MANUFACTURE OF
SPECIALIZED METAL-JOINING ALLOYS

Not only "MILD" steel, but also high carbon steel; cast steel; high-speed steel; manganese steel; stainless and all alloy steels, structural steel; aircraft steel, etc., in addition to all other metals from "A" for Aluminum to "Z" for Zinc can be joined faster, better, and more economically with one of the more than 150 different "Eutectic Low Temperature Welding Alloys".(All arc, torch and furnace applications.)

FREE...

72-PAGE BOOK! "Manual of Welding Design and Engineering" with 50 new photos, 60 new drawings. Send for YOUR free copy TODAY.

SAVES 40% ON LEAD-COATED STEEL-PLATE WELDING COSTS

"Having just completed a series of tests using EUTECTIC's rods on Terne Plate tanks, I thought you would be interested in the following typical results.

TIME SAVINGS PER 100 TANKS!

Airtack and weld complete..43.7%
Wire Brush welds.....18.6%
Test and Repair leaks.....32.6%

"This reflects a savings of 43.85 hours (40%) per 100 tanks. The comparisons were made on production runs and the hours per 100 tanks shown are actual time study standards used for incentive purposes.

"I wish to thank you for the splendid cooperation which made this savings possible." —*L. L. D., Ind. Eng., Stolper Steel Products Corp.*

EUTECTIC WELDING ALLOYS CORPORATION
172nd Street & Northern Boulevard, Flushing 58, New York, N.Y.
WE9

This new manual of yours sounds like a very helpful book. Send me a FREE copy with the understanding that there will be no cost or obligation now or later.

Signed .....
Firm .....
Address..... Zone .....
City..... State.....

LOS ANGELES, CAL. • SAN FRANCISCO, CAL. • CHICAGO, ILL. • MINNEAPOLIS, MINN. • INDIANAPOLIS, IND. • BOSTON, MASS. • BALTIMORE, MD. DETROIT, MICH. • ST. LOUIS, MO. • OMAHA, NEBR. • CINCINNATI, OHIO • CLEVELAND, OHIO • PHILADELPHIA, PA. • DALLAS, TEXAS PORTLAND, OREGON • PITTSBURGH, PA. • HOUSTON, TEXAS • MILWAUKEE, WISC.

INDOOR PILE DRIVING

(Continued from page 35)

where the piling had separated from the floor.

Most of the 86 new piles needed would have to be driven to 65-ft depths—some piles would have to go down as far as 116 ft. The $64 question was: How do you drive a pile 65 to 116 ft where there is only a 34-ft clearance between the floor and the roof trusses?

Can you answer that question? Ben C. Gerwick, a San Francisco pile-driving contractor, could.

Gerwick knew that the piles—10-in., 49-lb H-beams—were to be driven to a resistance equal to a 40-ton load. He reasoned, properly, that this was the only major requirement to satisfy. Nothing in the contract specified that the piles had to be of one-piece construction. There was no reason on earth why they could not be made up of many short pieces welded together. Providing, of course, that all of the welding could be done above ground.

Gerwick, consequently, divided the piles into 17-ft sections. To do the driving, he used a mobile crane with hanging leads and an air-operated pile-driving hammer. When one pile had been driven to near floor level, another 17-ft beam was butt welded to it. Thus it was easy to drive in the piles to whatever distance was required.

How the Work Was Done

The first step to be undertaken was to break up the floor at the points where piles were to be driven. The concrete was chipped away and the reinforcing bars were flame-cut and bent back (Fig. 1) to provide 3 by 5 ft openings.

Step two was to place the 17-ft H-beam lengths, used as piles, in their proper positions (Fig. 2) so that the mobile crane could proceed immediately from one pile to the next. The driving proceeded until all piles had been driven close to floor level.

Step three was to weld on another 17-ft length to each pile. Figure 3 shows the special jig designed to insure precise alignment during tack welding. Note how this jig was affixed at the joint of two pieces of piling during the tacking operation. Upon completion of tacking, the jig was removed and the weld completed. The full-strength joint was capable of resisting the severe impact and compressive stresses caused by the driving.

A heavily reinforced pile cap was designed to project a minimum of 6 in., under the floor, beyond the 3 by 5 ft openings. Floor patches were poured as an integral part of the pile cap. The finished view of the same area pictured in Fig. 2 may be seen in Fig. 4.

* * *

W. G. Eldridge, superintendent of Pan-American's building and facilities department, handled the job for P.A.A. W. R. Grace, of the same department, supervised the work.

OCEAN A TEST TUBE

(Continued from page 34)

Kure Beach, approximately 15 miles away from the station at Harbor Island. At this station, several thousand samples of metals and materials have been out in the elements on the beach anywhere from several months to several years. These are on racks set 30 deg from the horizontal.

The samples are in several sizes, but the most common size is 5 by 8 in. Samples are held in place by ordinary telephone (or electric wire) insulators fastened with Monel screws. When a sample needs to be removed, it can be pushed upwards. The supporting racks are made by welding Monel sections together; the uprights are anchored in cement.

The third testing area is about ¼ mile inland from Kure Beach and has the largest number of samples. One company has over 5,000 specimens under test here.

Which Screens Last Longest?

Both Kure Beach testing stations have proved some amazing results. For instance, several hundred different kinds of wire screen are being tested. The screens are placed in two different ways: one boldly exposed to the elements and the other, directly underneath the first, protected by an overhanging roof. In nearly every instance, the screen in the sunlight lasts much longer than the one of the same material under the protection of the roof. Again we do not know why.

By these methods of testing, metals are given the same conditions of operation or exposure that they would encounter under service life.

Records of all samples are not kept by tags or labels, which could become lost, weatherbeaten or unreadable, but in a master file. A check of this file will give the complete record of any sample from any section. Such information as the analysis, manufacturer, length of exposure and condition at regular intervals is kept for reference by a staff under the supervision of Rod Teel, assistant manager.

From the reel on the fishing rod to the telephone cable under the street, corrosion is a problem to everyone, and its price is very high. It is also a problem in welding. They do not claim to know all the answers at Sea Horse Institute, but they have the facilities and are rapidly finding out the whys and wherefores.

JUST A REPAIR?

(Continued from page 39)

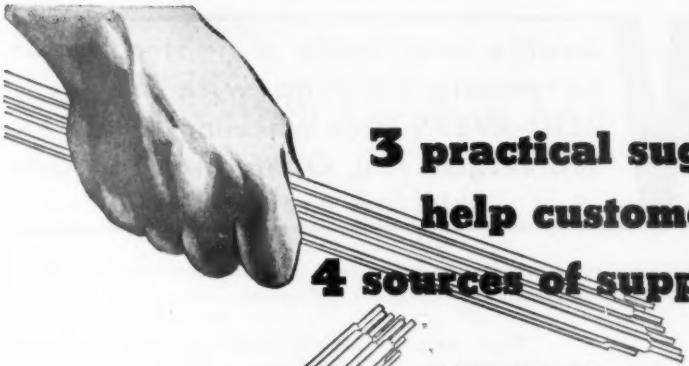
warpage. The depth of the deposit was ½ inch. After the first pass was made, a flux-coated rod was used instead of the paste flux.

When the build-up had been completed, the journal was allowed to cool slowly to room temperature. It was then placed in a vertical boring mill for machining.

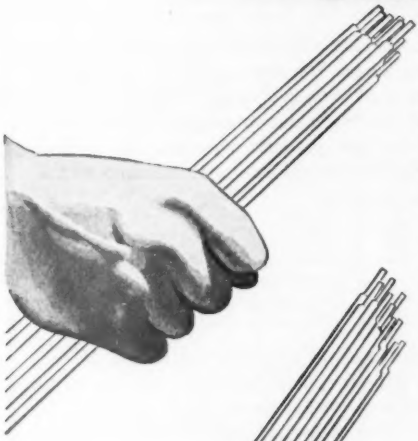
The entire job was completed over a week end so there wasn't any downtime or lost production to be figured in the cost. One weldor and one helper completed the build-up in eight hours of actual labor.

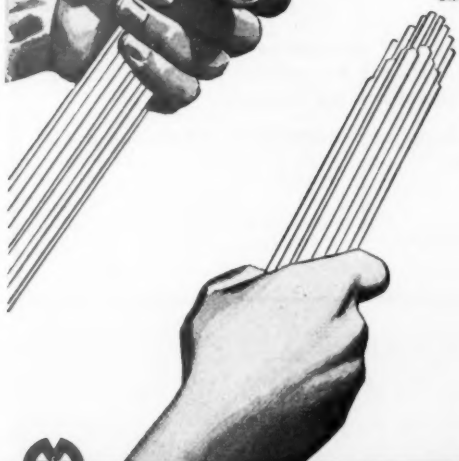
Twenty pounds of brazing wire were used. One cylinder of oxygen (220 cu ft) and one of acetylene (100 cu ft) were consumed. Total cost of labor, including machining, at overtime and materials amounted to approximately $300. This is a saving of $1,000 over the cost of a new dryer.

The actual saving, though, is only a part of the story. The filler metal used on the journal is denser, more resistant to corrosion and has a longer wearing surface. This is a repair that is *not* just a repair but a vast improvement over new equipment.



3 practical suggestions help customer maintain 4 sources of supply





PROBLEM: Production of army tank hulls—being built by one of the largest air conditioning manufacturers in the East—was jeopardized because of shortages and uncertain delivery on molybdenum-modified 18-8 stainless electrodes. For safety, the fabricator wanted to maintain four sources of supply. But, in using 3 out of the 4 makes of electrodes, porosity appeared in the welds.

SOLUTION: M&T's local welding sales-engineer investigated the problem and came up with the right answers. His suggestions were:

(1) use of higher currents on all electrodes

(2) depositing the first inch of weld on scrap plate to eliminate cold starting of electrodes

(3) better storage of electrodes to avoid moisture pick-up

RESULT: Satisfactory welds are now being obtained with *all four* brands of electrodes.

Your nearby M&T representative is qualified to give you genuine assistance on any welding problem. Call on him when you need help. Make use of his broad background of experience in every phase of welding.

MUREX®

Electrodes

Arc Welders • Accessories

METAL & THERMIT CORPORATION 100 East 42nd Street, New York 17, N. Y.

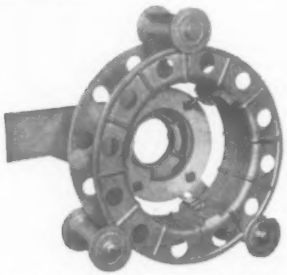
NOW

Double and Triple weight coils for automatic welding with the new REID-AVERY (free wheeling) REELS for Submerged Arc, Open Arc, and Gas Shielded Arc Welding

Raco Reel for 150-200# coils with floor mounting stand.

Decrease down-time by using larger coils. Machines now equipped for 25 lb. coils can use up to 75 lb. coils with these new reels.

These cast aluminum alloy reels ride on ball-bearing trunnions with deep flanges. The wire uncoils with remarkable ease and yet there is no chance of overrunning and throwing loops over the side. No brakes or drags of any kind are necessary. The wire itself prevents overrun. These "free wheeling" reels provide the absolute minimum load on the automatic welding machine.



Raco Reel for 25#-50#-75# coils. Mounted on popular submerged arc machine.

The Reid-Avery reels are available with stands for floor mounting or with special spiders for direct attachment to most popular automatic welding machines. Three reels 12" ID x 4" wide, 14" ID x 6" wide, and 25" ID x 4" wide nominal size are in stock for prompt delivery.

Raco Reel shown split for loading.

Note the simple split reel construction with suitcase type latches. Coils can be replaced in seconds and no wrenches or special tools are required.

We are equipped to supply all sizes of layer wound coils for these reels.

The REID-AVERY COMPANY
INCORPORATED
DUNDALK • BALTIMORE 22 • MARYLAND
SINCE 1919 PRODUCERS OF ARC WELDING ELECTRODES AND WELDING RODS

How Far Will a Pound Go?

BY T. B. JEFFERSON

"How MUCH will it cost?" That is the question usually asked when a hard-facing job is brought into a welding shop. Similarly, when a weldor is called into a machine shop to correct a machining error, the question changes to "How long will it take to do the job?" If it takes too long, the piece will have to be taken out of the machine; otherwise the rebuilding job can be done right in place.

The answers to both of these questions depend wholly upon the amount of material involved. Most weldors know how many pounds of welding electrode they can deposit per hour. Since the sq in. of area to be covered and the thickness of the deposit required can be determined readily, the only information that is lacking is the number of pounds of electrodes that are needed to do the task. Once the number of pounds of electrodes required is known, the time involved and the cost of a particular job can be readily ascertained.

Aided by the accompanying nomograph, it is possible to determine rapidly the number of sq in. of surface of a given thickness that may be obtained for every pound of welding rod deposited. Then, knowing the number of sq in. covered per lb, it is easy to determine the pounds that will be needed for a given area.

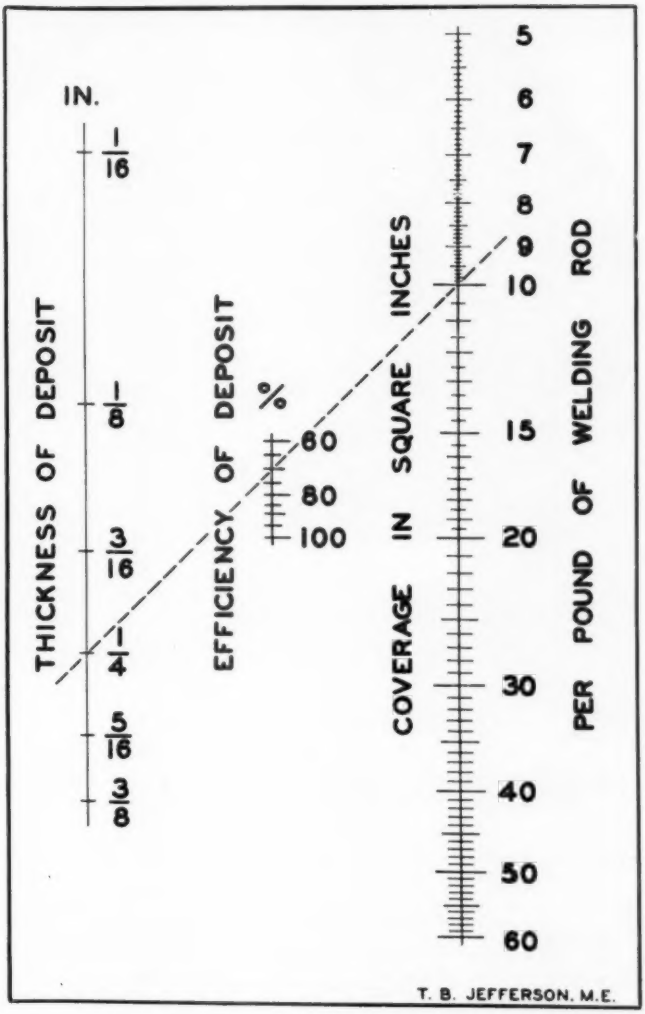
The only unknown in this nomograph is the efficiency of the deposit. This can readily be determined by referring to Engineering Data Sheet No. 143 (page 51, THE WELDING ENGINEER, August, 1952).

Having found the number of square inches that will be obtained per lb of welding electrode, and from your knowledge of the lb of electrodes that can be deposited in an hour, it is simple to figure how much welding rod will be required and how long it will take to do the job.

To illustrate the workings of this nomograph, the following example is solved:

Assume that a deposit of ¼-in. thickness is required and it is known that the welding electrode is 70% efficient. The number of sq in. of surface that will be covered ¼ in. thick per lb of electrode deposited will be determined by placing a straightedge so that it connects ¼ in. on the thickness scale with 70% on the efficiency scale. The answer will be found where the straightedge crosses the coverage scale, in this case at 10.

Consequently, a pound of welding electrode that is 70% efficient will deposit ¼ in. of weld metal over an area of 10 sq in. If the total area to be covered is, say, 163 sq in., 16.3 lb of electrodes will be required. If it takes half an hour to deposit a lb of electrodes, the job will take 8 hours and 9 minutes.



Reprinted from THE WELDING ENGINEER, *January 1941*

The man on the job..

wants VICTOR'S Versatility !!

This man with a VICTOR torch welds mild steel extension handles onto high carbon pliers—a small and ticklish job. The same torch, by simple change of nozzles and tips, can be quickly converted to new job needs, such as welding large castings, heating, brazing, descaling, flame priming, soldering—or to cutting, by addition of cutting attachment.

VICTOR's precision-built apparatus also gives you better flame control, saves gas, gets work done faster. Ask your VICTOR dealer for an on-the-job demonstration NOW.

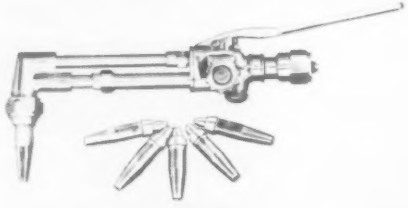
LOOK FOR THE VICTOR DEALER SIGN!

VICTOR
Welding and Cutting Equipment since 1910

Ask him to show you why it costs less to own and operate VICTOR.

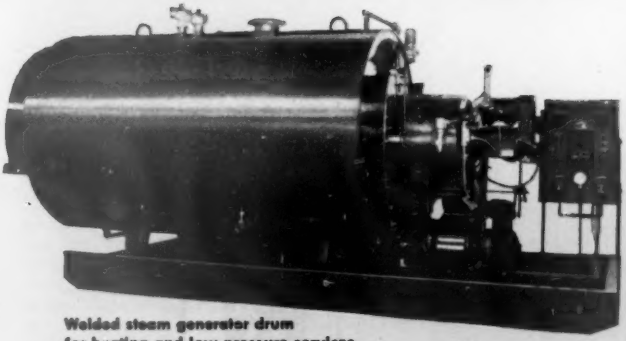
Dealer inquiries invited.

Model 2450 Cutting Attachment for VICTOR 300 Series Welding Torches cuts metal up to 8" thick.



VICTOR EQUIPMENT COMPANY

3821 Santa Fe Ave.	844 Folsom Street	1312 W. Lake St.
LOS ANGELES 58	SAN FRANCISCO 7	CHICAGO 7



Welded steam generator drum
for heating and low-pressure services.

Dependability up—cost and weight down—

thanks to RADIOGRAPHY

BECAUSE radiography proves it sound, welding can be used for making better pressure vessels. And with results such as these: In these steam boilers approximately 15% in weight was saved—costs dropped 10% to 20% dependent on design pressure.

Easy to see, isn't it, how radiography opens new fields for welding—why it increases business.

Radiography is quick to detect any serious lack of fusion or gas porosities in a weld. It can help you make sure only top-quality work leaves your shop.

If you would like to know more about how it can help you, get in touch with your x-ray dealer and talk it over.

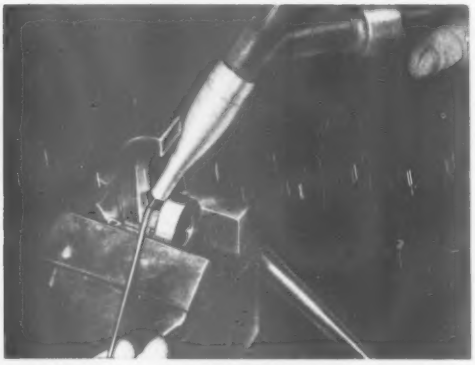
EASTMAN KODAK COMPANY
X-ray Division • Rochester 4, N. Y.

Radiography . . .

another important function of photography

Kodak
TRADE-MARK

New Products . . .



POINTED nozzle of inert-arc torch gets it into restricted-access weld joint. Its rating is 150 amp d-c, 100% duty

EXCEPTIONALLY wide welding range of 20 to 180 amp on new P&H welder fits it for auto body shops and farms

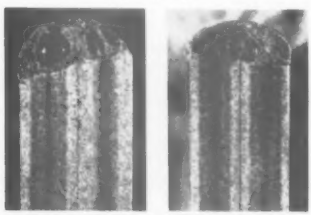
Ceramic Welding Nozzle

250 SPECIALLY-DEVELOPED ceramic welding nozzles for inert-arc welding are available for deep-section welds (see above). In addition, the flow of inert gas is said to be more directional with less volume, without increasing arc-clamping characteristics.

A light metal adapter inside the new nozzle dissipates welding heat readily, thus affording torch protection. Length of the nozzle is 3-in., with either ¼ or 5/16-in. orifice. The adaptor thread is 13/16-16 THD. Rating of the nozzles is 200 amp d-c, intermittent duty and 150 amp d-c, constant duty.

TRU-OHM PRODUCTS DIV., Model Engineering and Mfg. Inc., Chicago 18.

* * *



Anti-Porosity Agent

251 A NEW fusing agent and deporosite called "Weldaluminite" is said to prevent porosity with all types of inert-arc welding, including rimmed steel applications. The compound contains aluminum which deoxidizes the weld pool and is so formulated that it retains the aluminum at the point of welding. No gas bubbles rise to the surface of the molten metal, to cause hole as in left photo above.

"Weldaluminite" can be either sprayed or brushed on the joint before welding but must be allowed to dry before striking the arc. No filler metal is necessary in some applications.

Microscopic examinations have shown that the weld deposit produced by the compound on rimmed steel exhibits the same uniform fine-grained structure as that obtained with aluminum 'killed" steel. See right picture above.

SPEKALUMINITE CO., Ossining, N. Y.

* * *

Gold Galvanizing

252 A NEW cold galvanizing compound, not a paint, can be applied by paint brush, electric spray gun or by cold dip process. It is said to offer true cathodic protection because it combines with the base metal to leave a coating of 96 parts by weight of chemically pure zinc. It can be applied on top of welds, rusty surfaces, ship's hulls and many other metal surfaces used in farm, industrial, military and home installations.

GALVANITE CORP., New York City 1.

INFO-AID CARDS

On pages 17-18, filled out with item numbers of products catching your eye, will bring you additional information about them.

Small P&H Welder

253 AN unusually wide welding range of 20 to 180 amp is featured on a new P&H limited-input type welder, Model TR-181. A high open circuit voltage of 65 volts is produced, but the welder will handle everything from thin fender metal up to heavy sections of machinery or tractor hitches.

Designers of the new welder say it is the only limited input welder with "Dial-Lectric" control. A three-quarter turn of the knob provides continuous heat control from low to high amperage. The machine has a high range for general welding and a lower one for light gage metals. Power consumption is about 1 kwh per hour of operation. Welder comes with all accessories including cables, welding helmet and lens, electrodes and welding manual.

HARNISCHFEGER CORP., Milwaukee 14.

* * *

Light Thor Grinders

254 A COMPLETELY new No. 2 line of lightweight Thor pneumatic grinders, drills screwdrivers and nut setters feature interchangeability of housings, handles and attachments. There are 85 different sizes cataloged ranging in weight from a 1 lb 1 oz grinder to a 2 lb 11 oz angle screwdriver. A new type air motor in the tools affords maximum power output at standard air-line pressures.

INDEPENDENT PNEUMATIC TOOL CO., Aurora, Ill.

* * *

(Turn to page 56)

30 YEARS AGO

TWO arc welded radio towers 150-ft high have been built at Peking, China, as part of the wireless installation at the American Legation Guard. The towers stand on top of the Tartar Wall, a 14-mile long enclosure that sets off part of the city. Average height of the wall is 30 ft high and average width 50 ft. Standard pipe sections were used as structural members, since no structural shapes are available in this part of China.

—30 YEARS AGO—

ONE of the biggest subjects before the fall meeting of The American Welding Society in Chicago is the development of a research program for each section. It is felt that every local section should be actively interested in at least one research problem.

—30 YEARS AGO—

THE Niagara Welding & Boiler Works, Inc., Niagara Falls, N. Y., was recently incorporated to manufacture boilers and other iron products.

—30 YEARS AGO—

PRODUCTION brazing is aiding in the production of the headrests for dentist's chairs. The ball in the ball-and-socket joint of the headrest would always work loose since it was only soldered in place. Substituting a steel ball for a cast iron one, the manufacturer is brazing them by the oxy-acetylene torch method.

—30 YEARS AGO—

"SALVAGING a Sand Sucker" is the title of an interesting ad this month run by Oxweld Acetylene Co. It tells how a 7-ton casting worth $3,500 was rebuilt with a ton of high carbon steel in only six days with a total outlay of $1,166.

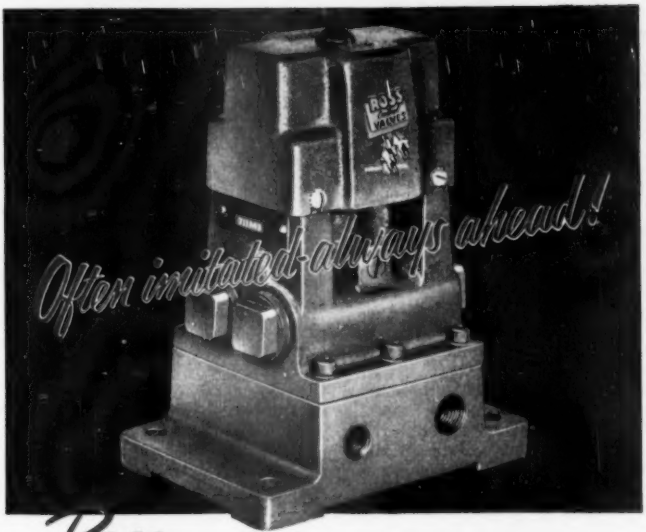
—30 YEARS AGO—

ATOMIZING iron or steel in wire or dust form with the aid of the oxy-acetylene film and then impacting the particles on a work surface is a new use of the welding flame. Called the Schoop Metal Spraying Process it has been perfected by the Metals Coating Company of America. There are three methods for spraying the metal, using a small "pistol", a metal dust process and a "mass coating" machine for doing large numbers of parts.

—30 YEARS AGO—

SEVERAL firms have brought out compact portable engine-driven arc welders lately. They can be easily mounted on a truck-bed and transported over a wide area, such as a shipyard or a big steel plant.

IF IT'S A VALVE
FOR WELDING—
ROSS HAS IT



Ross Solenoid Operated, Pilot Controlled Valves

The reputation and performance of Ross "711" Series Valves are so outstanding that imitations are constantly being attempted. Through constant improvements, the "711" remains the leader and the envy of the trade. Here's why—

- Dependable—10 to 20 million maintenance-free cycles, and many more tens of millions of life-cycles, are not uncommon.
- Speedy—split second operation; oversized exhaust
- Low current consumption—inrush of 1.2 amps @ 110/60
- Positive seal — poppet construction; Hycar seats
- Easy maintenance—only a few moving parts; bodies interchangeable without removing piping
- Many modifications—vacuum, air, and liquid service; various pressures; AC or DC solenoids; momentary contact

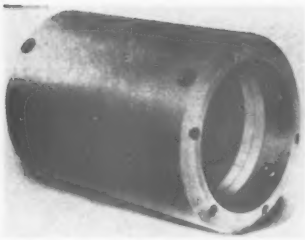
Write for full information on the Ross "711" Series

Control

ROSS OPERATING VALVE COMPANY

120 E. GOLDEN GATE AVE., DETROIT 3, MICHIGAN

Engineers at Your Service
in all Principal Cities



Repair Piping Breaks

255 SPECIAL fittings called "Weld-Ends" securely rejoin a broken or leaking pipe section so flow can be resumed immediately, even before welding. It is said to eliminate mud or vapor packing, steaming out of pipelines and 'hot' tie-ins.

The fitting is slid completely over the end of one pipe. The weldor marks off half the fitting length from the piping gap back on the pipe. The fitting is then slid back to this mark, so it is divided equally over the joint.

Running circumferentially around the sides are the clamping and adjustment screws. When the "Weld-End" fitting is in place these screws are pulled up as tightly as possible. The holes contain thrust screws which push forged steel thrust rings, which in turn force a Neoprene packing ring into the space between pipe and fitting. When the thrust screws are tight as possible, a joint has been made which is as strong as the pipeline itself.

After installing the fitting welding can be delayed for several weeks (if explosive conditions are present). Sooner or later, however, the fitting is fillet welded to the pipe and all screw holes are seal welded to a depth of 1/8 in.

"Weld-Ends" can be supplied in sizes from 2 up to 36 in. or larger if required. Sizes 2 to 10 in. are machined from heavy seamless steel tubing. Larger sizes, from 12 to 36 in. are first rolled from carbon steel plate, welded, X-rayed and annealed under specifications as found in paragraph U-68 of the ASME code.

PIPE LINE DEVELOPMENT CO., Cleveland 15.

* * *

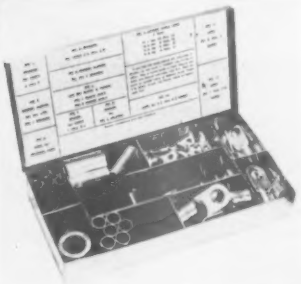
Stainless Hard-Facing

256 A LOW-PRICED hard-facing electrode named Wallex No. 2 is said to have good abrasion and shock resistance and provide stainless protection about equal to that of type 410 stainless. The deposit is makes consists of chrome, manganese, silicon and iron.

Rockwell hardness is 49 to 53. Recommended for shovel teeth, drag line buckets, tractor grousers, scraper blades, mixer blades, guides and drag chain links, it is available in 1/8, 3/16 and 1/4 in. diameters in electrodes 14 in. long.

WALL COLMONOY CORP., Detroit 3.

* * *



Cable Repair Kit

257 ON-THE-JOB repair of welding or power cables is greatly aided by a new "Fast-Fix" cable repair kit. With it, you can put new lugs or splice on No. 6 through No. 4/0 welding or ground cable or put new lugs on No. 14 through No. 6 power cable. Rubber sleeves and friction tape are included for insulating and otherwise properly finishing off the work. This kit supplements the "Fast-Fix" oxyacetylene hose repair kit, brought out some months ago.

A Tweco lug set block and punch come with the kit to install solder-type lugs and splicers mechanically. This method of attaching lugs is recommended by the impacted copper-to-copper contact between lug and splicer barrels and the cable strands.

The kit is packaged in a compartmented, steel box carrying complete instructions on the under side of the lid. Replacement parts are available.

GAS ARC SUPPLY, Philadelphia 2.

* * *

Detergent for Magnesium

258 RAPID cleaning of aluminum, anodized aluminum and magnesium parts in power washing equipment is made possible with the development of a new detergent known as "Kelite PWB No. 81," it is a powder readily soluble in water. It affords complete removal of virtually all types of soil, including Reynolds, Alcoa and Kaiser ink marking in only one minute.

Other qualities of the new detergent: non-foaming, non-corrosive, extreme stability and long life. It was developed to the specifications of a leading aircraft manufacturer.

KELITE PRODUCTS, INC., Los Angeles 12.

Hand Bend 1-In. Bars

259 UP to 1-in. diameter cold-finished bar steel and 1¼-in. steel tubing can be bent on a new hand-operated bender. Designated the Di-Acro No. 4, it offers a radius bending range from 0 to 12 in. Its own special stand is available for it as is a complete line of fittings for bending tubing, angles, channels, extrusions, mouldings, strip stocks, bus bars, etc.

O'NEIL-IRWIN MFG. CO., Lake City, Minn.

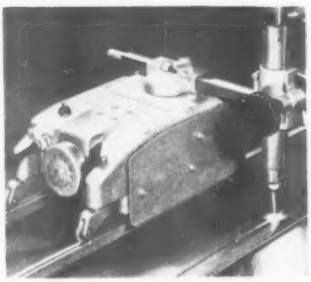
* * *

Adhesive Joins Aluminum

260 A NEW thermosetting adhesive is claimed to join aluminum to aluminum with shear strengths exceeding 3,000 psi. Called "A-6," the compound bonds with only contact pressure and requires only moderate temperatures (200 F) for curing, say its makers. The test was run on 24 ST alloy, 0.064 in. thick.

ARMSTRONG PRODUCTS CO., Warsaw, Ind.

* * *



Low-Cost Carriage

261 A NEW lightweight machine carriage for straight-line, bevel- and circle-cutting of metals, as well as welding and flame treating is said to be low in cost. Called the Oxweld CM-45, it weighs only 33¼ lb, complete with torch, so it can be easily moved from one job to another.

Housed in a one-piece aluminum casting it is powered by a strong, electrically reversible motor. A centrifugal type governor covers a stepless speed range of 4 to 32 ipm. Other speeds are possible with special motor gear heads.

Operating controls consist of a three-position (on-off-reverse) motor switch, speed-control dial and a two-position clutch lever. The two forward wheels are drive wheels, knurled for better traction and tread hardened.

Bevels can be cut at practically any angle, either in straight lines or circles ranging from 2 to 54 in. in diameter.

LINDE AIR PRODUCTS CO., New York City 17.

(More New Products on Page 94)

the D-C Rectifier Welder with ARC-DRIVE CONTROL

. . . INSTANTANEOUS RESPONSE TO ARC-LOAD CHANGES

. . . INSTANTANEOUS RECOVERY

. . . REDUCED ARC BLOW

. . . COMPLETELY ADJUSTABLE BY OPERATOR

Westinghouse RA Welders with new positive arc-drive control now prevent shorting when used on "drag" welding applications. In addition, they allow complete penetration on root passes of vertical and overhead welds. Arc-drive control is obtained by adjusting the ratio of short-circuit current to welding current without changing open-circuit voltage. Actual amount of arc-drive current can be varied by the operator.

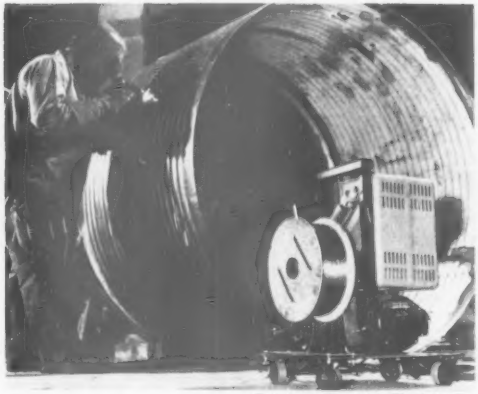
For information on this improved RA Welder or other Westinghouse Welding Equipment, write Westinghouse Electric Corporation, Welding Division, P. O. Box 868, Pittsburgh 30, Penna. Ask for Welding Booklet B-5453.

J-21607-1

Westinghouse

WELDING EQUIPMENT

on the job



Courtesy General Electric Co.

OPERATOR at Cherry-Burrell Corp. uses an inert-arc electrode holder with automatically fed stainless wire

U-BOLTS fastened to channel hold down valve bodies to protect welding fittings from back pressure effects

Less Finishing Cost

BY USING a modification of the inert-arc welding process in which filler wire is fed automatically to a tungsten arc, the Cherry-Burrell Corp., Little Falls, N. Y., has achieved a 30 to 50% reduction in finishing costs. This is even more important than it sounds since finishing operations have traditionally accounted for two-thirds of the total fabrication costs of the stainless-steel coolers, processors, farm tanks, pumps and other products that Cherry-Burrell manufactures.

Basically, the new welding equipment is a water-cooled tungsten electrode holder for manual operation. To this, however, has been added a control switch and a gear assembly that pulls the filler wire from a spool to the arc.

The operator first presets the desired wire speed by means of a rheostat and then strikes the arc as though he were holding a normal inert-arc torch. As soon as a molten pool has formed, he pulls a trigger mounted on the electrode holder. This causes the wire to feed into the arc, and the flow of filler material will be continuous as long as his finger holds down the trigger. To stop the wire feed at any time, he has only to release the trigger.

In the picture at top left, the equipment is being used to weld on the lining for a milk-mixing vat. Such fabrication used to be done with conventional metal-arc equipment. Then the excess metal, a considerable amount, had to be ground away.

Formerly, the excess metal was removed with a 36-grit grinding wheel, after which the weld was polished with a 90-grit wheel. Now the finishing usually starts with the 90-grit wheel, according to Robert F. Mager, process engineer for Cherry-Burrell. Another advantage is that the new welding method leaves almost no pinholes. Welds on food-processing vessels must be free from porosity and pinholes for sanitary reasons.

* * *

Save Stainless on Snorkels

MONEL cladding of extensible radio and radar masts for snorkel-equipped submarines is saving the Navy $2,567,700. Instead of seamless tubes of 18-8 stainless steel, the new design uses low-alloy steel tubing with a clad surface of Monel.

The snorkel is a device used to bring fresh air into the submarine for the benefit of the crew and for the operation of some of its equipment. The snorkel is utilized also for exhausting waste gases. In this way, the submarine may charge its batteries by running its Diesel engines without surfacing. While snorkeling, the submarine lies just below the surface so that the snorkel can protrude above the water.

With the advent of snorkel, shortly before the end of World War II, extensible masts that could be used at snorkel depth were needed. The tubes used for this service must have smooth, accurately machined extensions to provide good bearing surfaces for extension, retraction and rotation. They must also be made of material that will withstand salt-water corrosion.

* * *

Hold-Down for Relief Valves

By Elton Sterrett

WHEN the relief valves on a pipeline kick open, a back pressure is set up that may be damaging to parts of the line. To counteract such pressure, one weldor devised a way of holding the valve bodies against the reaction.

U-bolts of ¾-in. steel rounds were formed to fit closely against each valve casting (right picture). Lower ends of these loops were passed through holes flame-cut in a 4-in. steel channel. The channel, in turn, was set permanently on the concrete base for the valves by welding it to a set of angle braces. The angles were dispersed through the concrete for the purpose of distributing the stress over a wide area.

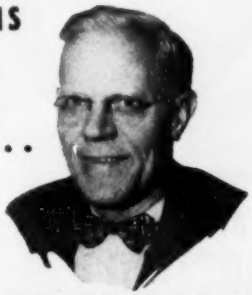
This method of tying down the relief valves protects the welding fittings from all stresses other than those that are imposed by the pressures of the liquid within the line.

Coming in October!
The Stainless Steel Story

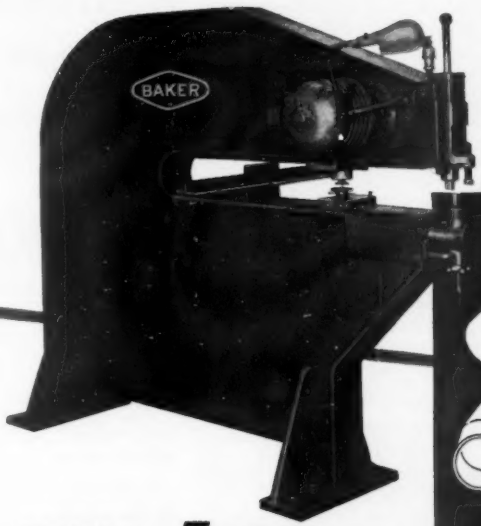
"FOR MANY CUTTING OPERATIONS

THE BAKER SHEAR

MULTIPLIES OUR PRODUCTION RATE"...



Says Mr. Arthur Christen, Vice-President of The Fred Christen & Sons Company, Toledo, Ohio



SAVE TIME 5 WAYS!

Do your heavy duty cutting *faster and better* with the Baker Tru-Edge Contour Shear! It reduces operating time to less than ¼ of the time required on previous machines—as shown by actual cases on record because:

- ★ FAST CUTTING . . . 10 to 36 ft. per minute.
- ★ BURR FREE EDGE . . . No finishing required.
- ★ NO TEMPLATE NEEDED.
- ★ NO STARTING HOLE for inside cuts.
- ★ Cuts various thicknesses without adjusting machine.

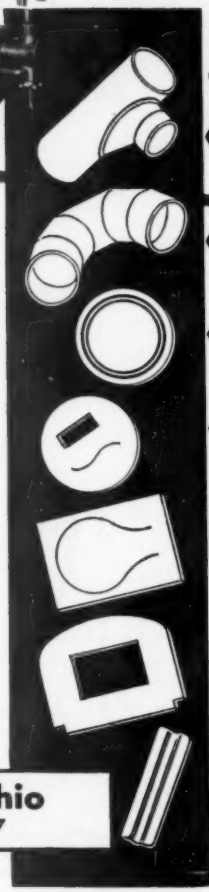
Capacity: 6 gauge in mild steel, 7 gauge in stainless steel. Simple in design, only 5 moving parts. Versatile—does many jobs with speed and accuracy. Saves labor. Baker-built dependability.

WRITE . . . for illustrated bulletin and price

BAKER BROS., Inc., Toledo, Ohio
Makers of Better Machine Tools . . . Since 1867

The Tru-Edge Contour Shear is made by Baker Bros., Inc., under license from Industrial Devices Corp., Detroit, Mich.

DOES ALL THESE JOBS



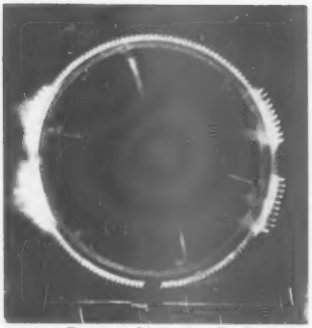
- Quantity 3, no template required.
- Quantity 85, save time with template—no layout required.
- Beading operation, entirely within sheet—compare with other methods.
- Inside cuts, no starting hole required.
- Inside cut, no metal removed—parts will mate when finished.
- This job was cut in 22% of time of previous method.
- Custom or low-quantity beading done with low tool cost.

Selecting optimum welding heat is easy with the portable Mullenbach ARCTROL . . . permits voltage adjustments *while* you weld, *where* you weld!

Saves time-wasting trips to the welding machine, eliminates voltage approximations, permits instant remote control as job requirements vary. A necessity on precision welding—a tremendous help on production welding!

Completely portable, foot operated. Normal welder range unaffected. Available for most makes of D.C. Welders. *Write for folder; include name and model of your welder.*

Mullenbach
Electrical Manufacturing Co.
2300 East 27th Street, Los Angeles 58, California



Courtesy Linde Air Products Co.
EFFICIENT oxyacetylene set-up spins gear for flame-hardening

Hardening Starter Gears

STARTER gears for Packard autos get an efficient flame-hardening treatment that raises the hardness of the teeth from 350 to 540 Brinell. Each gear is 15 in. in diameter and has 159 teeth.

Ten flames from each of four heating heads heat the gear as it spins around in a flame-hardening machine. In about 20 seconds, with teeth temperature around 1,500 F, the gear is dumped into an oil bath to be quenched.

* * *

Big Welded Press

WELDED from 6-in. plate and castings, Lockheed's new 8,000-ton triple-action hydraulic press, installed at the Burbank, Calif., plant, is said to be the largest of its kind in the aircraft industry. The press weighs 2,373,000 lb. In one operation, it will stamp out integrally stiffened airframe sections that formerly had to be made up of subassembled parts.

The new press was manufactured by Birdsboro (Pa.) Steel Foundry and Machine Co. with parts furnished by Birdsboro and the Bethlehem Steel Co., Bethlehem, Pa.

The WINNER

in the A. O. Smith

"CASH for a NAME" CONTEST

is

PRESTON MURRAY

Wellsville, Utah

who submitted

Field King

and was awarded FIRST PRIZE of $300.00 by the judges

SECOND PRIZE of $200.00 was won by Mrs. W. O. HOUGH Riverside, Calif.

THIRD PRIZE of $100.00 was won by C. G. BACH Seattle, Wash.

All of the many contestants who submitted names for the new A. O. Smith engine-driven welder have been sent gifts in appreciation of their interest and participation in this event. Only three of them could win prizes. We appreciate very much the gratifying response on your part to our invitation to compete in naming our welder.

A.O.Smith
CORPORATION
WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin

Designed to Lead the Field

the New A.O.Smith Field King

GAS ENGINE-DRIVEN DC FIELD WELDER

Here it is! The most advanced of all engine-driven welding machines now available!

It's the A. O. Smith "Field King," built to thrive on rugged jobs in the field . . . to endure the rough handling of transport . . . to withstand any weather . . . and to turn out better welds, faster and smoother!

Weld with new speed and ease! Produce cleaner welds and more of them per man-hour! You'll do it with the "Field King." Its fast-striking, forceful arc is easy to handle, always under control, not given to arc blow. You'll put down a uniform deposit of weld metal you'll be proud of.

Electric dual control! The "Field King" has series and shunt field adjustment for current control which permits constant engine speed at rated r.p.m. during welding periods. This accounts for the fast striking arc and superior welding ability of the A.O. Smith "Field King."

"Combat-tested, time-tested" engine of 20% greater horsepower than conventional machines; exclusive, patented electric idling control; a more efficient machine that has less bulk than older types . . . these, plus many other features, make the "Field King" the field welder for you!

For complete information, mail the coupon:

A.O.Smith

WELDING PRODUCTS

Welding Products Division, Milwaukee 1, Wisconsin
International Division: P. O. Box 2023, Milwaukee 1, Wisconsin, U.S.A.

Made by welders . . . for welders

A. O. Smith Corporation
Dept. WE-952, Welding Products Division
Milwaukee 1, Wisconsin

Rush complete information on your "Field King"

☐ 200-Amp., ☐ 300-Amp. Welder.

Name_____

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City_____ State_____

CROUCHING beside the 1,400 lb Kodiak bear he just shot is Jack Honhart of Atlas Welding Accessories. See below for its measurements

Photo courtesy Norton Co.

KNIFELIKE grinding wheel slits nibs of penpoint. The grit size is only 240

NEWS

$30,000 in Prizes Offered for Welded Machine Designs

DESIGNERS, engineers and manufacturers have the next 10 months to win themselves a piece of $30,000 in prizes offered for papers on arc welded steel machine design. Sponsor of the contest is The James F. Lincoln Arc Welding Foundation, Cleveland.

The money will be presented in 101 cash awards and the winning papers will receive national recognition. Any machine or component whose performance or appearance has been improved or whose cost has been reduced through the use of arc welding can be described in the paper.

Note: any person who has participated in the designing, planning or making of such machinery can compete in the award program by describing his work.

A total of $20,100 will be given in 54 awards in 18 different classifications of machine design (such as electrical, petroleum and gas, farming and ranching, printing, metal forming, construction and mining, etc.).The 18 first awards will be $500 each, second awards will be $250, third awards $150. In addition, 39 awards of $100 will be given for honorable mention papers. A total of $9,900 will be given in "grand awards" to the eight best-of-program papers. Top award here is $2,000, which will be added to the $500 first divisional award.

A brochure on the rules and conditions of the contest, which closes July 27, 1953, is available from the Lincoln Foundation, Cleveland 17, O.

* * *

Jack Honhart Bags Near-Record Kodiak Bear

ONLY half an-inch in skull length separated his Kodiak bear from the world's record, reports Jack Honhart, president of Atlas Welding Accessories Co., Ferndale, Mich. The 1,400 to 1,600-lb bear (no scales back in the bush) was shot May 20 in the Ugantick River country on Kodiak Island.

Weight of the bear was estimated by Honhart's outfitter, who made his guess after weighing in the bear's hide at 178 lb. This is the only method possible since there's no way to bring out such a big carcass.

Skull dimensions, the only ones that count in official measurements on bear, were 11¾ in. wide and 18½ in. long. This is only ½-in. short of a skull taken several years ago by Bob Reeves, who owns Reeves Aleutian Airlines; skull width of the two bears was the same.

Other measurements of the big animal: nose to tail, before skinning, 8 ft. 9 in.; nose to center of ears, 24½ in.; distance between ears, 22 in. (look at the picture above again); circumference around neck, 47 in.; circumference around chest, 102 in.; front pads, 13½ in. long, 10 in. wide; hind feet, 16 in. long, 9 in. wide, green hide measurements; nose to tail, 10 ft 1 in.; claw to claw, across front legs, 11 ft 3 in. Square of the hide was 10 ft 8 in.

Honhart used a Model 70 Winchester 30.06 with iron sights and 220 grain, silver tip bullets. The kill was a one-shot try through the neck at about 40 yards. Like shooting fish in a barrel, says Jack. Some fish!

* * *

0.006-in. Thick Wheel Slits Pen Point Nibs

JUST twice the width of a human hair, the thinnest grinding wheel in use today (right photo above) slits the nibs of pen points at the Esterbrook Pen Co., Camden, N. J. The 3½-in. rubber bonded wheel is only 0.006-in. thick and uses an "alundum" grit, size 240. Esterbrook has been making pens since 1858 and is the oldest in the country.

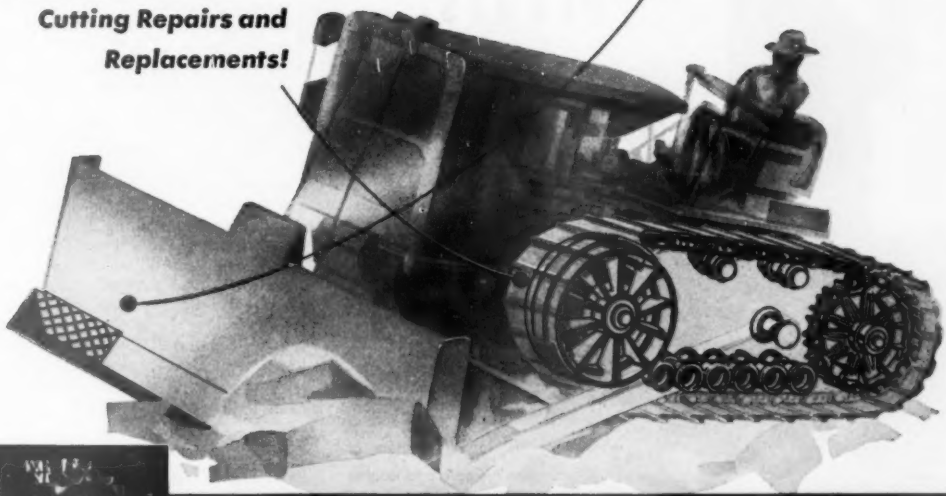
* * *

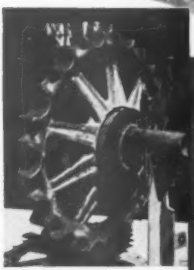
Atomic Engines for Flat Tops Studied by Westinghouse

RESEARCH and design work on an atomic power plant for aircraft carriers and battleships will be conducted by Westinghouse Electric Corp. under a contract with the U. S. Atomic Energy Commission. Work will be centered at the Bettis plant.

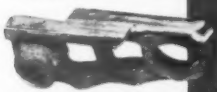
Where STOODY ALLOYS stretch out tractor life...

Reducing Downtime . . .
Cutting Repairs and Replacements!





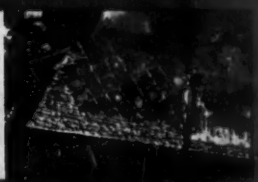
TRACTOR DRIVE SPROCKETS—rebuild and hard-face manually with Stoody Self-Hardening or Stoody 1027 to original size . . . rough grind high spots only . . . *gives service equal to new parts.*



TRACTOR RAIL LINK—hard-faced with Stoody 104, applied automatically. *Service life equal to new.*

TRACTOR IDLERS

TRACTOR ROLLERS



BULLDOZER END PLATES

BULLDOZER TRUNNIONS

TOP CARRIER ROLLS

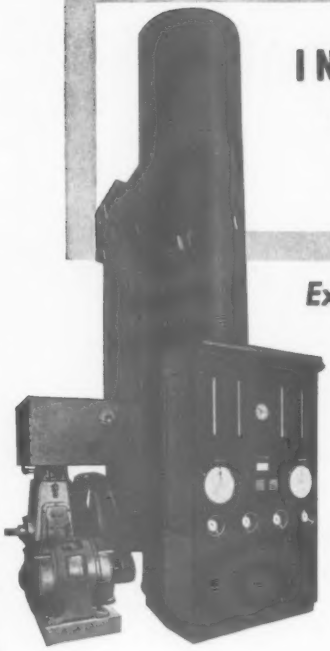
BULLDOZER BLADES

For detailed procedure on manual rebuilding of tractor parts, ask your dealer for a free copy of STOODY GUIDEBOOK.

A list of custom automatic welding shops prepared to handle crawler maintenance work in your area is available from your Stoody dealer . . . see "Welding Equipment and Supplies" in the yellow pages of your phone book—or write direct to Stoody Company

STOODY COMPANY

11941 E. SLAUSON AVENUE, WHITTIER, CALIFORNIA



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Built in standard sizes—15 meters or 530 cu. ft to 283 meters or 10,000 cu. ft.—in single and double rectification units. If you need them, larger sizes are available.

If the more than one quarter of a million INDEPENDENT CYLINDERS we have built were filled at one time, they would hold more than 50,000,000 cu. ft. of gas!

Furthermore, Independent Acetylene Cylinders hold from 5 to 10% more gas, and the uniformity of the monolithic filler insures even distribution of acetone. Oxygen Storage cylinders available in 12' and 20' lengths; capacities 850 and 1500 cu. ft.

10 C.F. 40 C.F. 60 C.F. 100 C.F. 150 C.F. 250 C.F. 300 C.F. 340 C.F.

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CYLINDERS AND GAS PRODUCING EQUIPMENT
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O'FALLON 5, ILLINOIS

"Field King" Welder Christened by A. O. Smith

WINNING name in the recent nationwide "Cash-For-a-Name" contest run by A. O. Smith Corp., Milwaukee, is "Field King." Entries trying to name the gasoline-engine-driven welder came from all over the United States and many foreign countries.

Winner of the $300 first prize is Preston Murray, a mechanic for Morning Milk Co., Wellsville, Utah. Second prize of $200 was won by Mrs. W. O. Hough, a housewife and ex-weldor of Riverside, Calif. The $100 third prize went to C. G. Bach, Isaacson Iron Works, Seattle, Wash.

The A. O. Smith judges considered the "Field King" name to best represent the many new features of the engine-driven welder. It has 100% electric control of welding current, with no governor adjustments necessary. Another feature is all-electric idling control said to present many advantages over dashtop models.

Several years of research by the A. O. Smith welding products division went into the new welder. It is produced in 200 and 300 amp models, the 200 amp model being currently available.

* * *

General Motors Standards Available to Individuals

THE materials and processes standards published by General Motors Corporation are available to organizations or individuals for a nominal subscription charge. They cover GM specifications and material numbers for such classifications as welding electrodes, welding design data, solders, fluxes, welding symbols, steels, cast irons, chemicals, rubber products, electrical cables, copper, aluminum, etc. Initial subscription is $15 per set, covering postpaid delivery and maintenance or revision service for one year. After the first year revision service may be renewed for $7.50 per year. Purchase orders should be addressed to General Motors Corp., production engineering section, General Motors Building, Detroit 2, Mich.

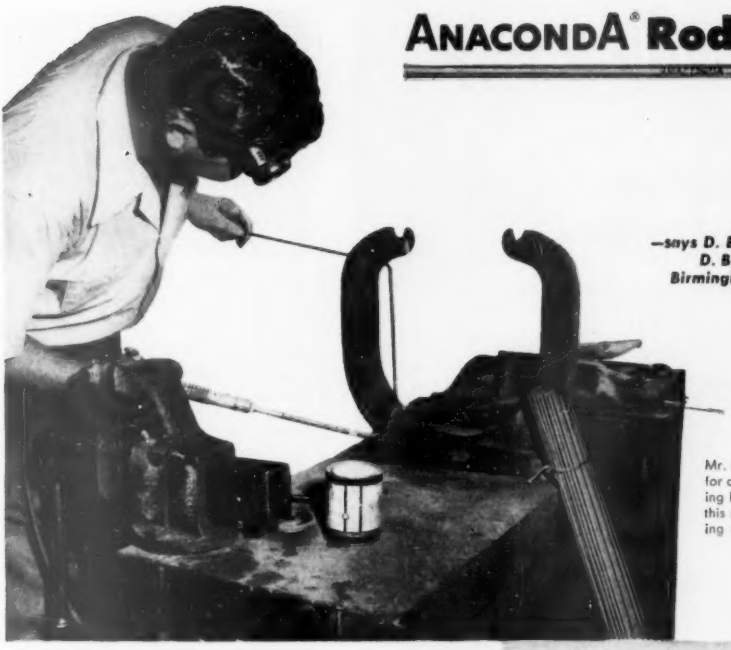
* * *

Ampco Metal Names Arc Welding Distributor

WESTERN Oxygen Co., 2949 Sixteenth Ave., S.W., Seattle, Wash., has been appointed exclusive distributor of Ampco welding rod products in the Seattle sales area. Made by Ampco Metal, Inc., Milwaukee, the line includes various grades of bronzes and aluminum-bronze electrodes as well as bare filler rods and wire for automatic welding.

ANACONDA® Rods flow easier- "tin" better

—says D. E. Brooks, D. Brooks Welding Company, Birmingham, Alabama



Mr. Brooks, braze-welding the cast iron yoke for a scale beam, using Tobin* Bronze Welding Rod. The quickness and ease with which this rod may be used are important in keeping the parts in alignment.

"ANACONDA Welding Rods sure help make jobs easier, not just in the shop but all over, on all kinds of work. We once repaired a 48" cast iron gear and had to build up the teeth. It took 35 pounds of rod to do it—it was a perfect job.

"Most of our work is cast iron—heavy stuff like coal mining equipment, slaughter house and construction machinery. We like a rod that has good "tinning" properties and that flows well with low heat. That's why we use ANACONDA. It really stays put.

"We make things ourselves like barbecue grills and stair rails. Of course, these jobs take only a couple ounces of rod. But the rod's got to be just as good. I guess we've worked on every kind of metal, including copper castings, and A. C. Welding Supply Company, our supplier here in Birmingham, has had the right rod for every job."

To cover a 50 mile radius, Mr. Brooks has two trucks outfitted with arc welding machines and a station wagon to transport men, tools and oxyacetylene equipment. In his building he also has a couple of lathes, milling machines and other machinery to offer machine shop service.

Consult your nearest supplier for experienced service and practical advice . . . and for the latest news on welding procedures, write for free booklet B-13. The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

52172

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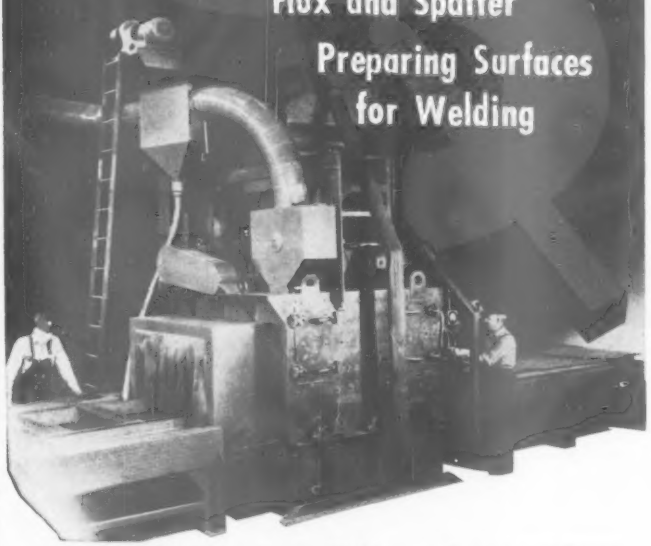
Preparing Weldments for Surface Finishing

Removing Welding Flux and Spatter

Preparing Surfaces for Welding



Airless Wheelabrator Cleans Weldments Faster and Better

Welded assemblies are cleaned mechanically at high speed with the airless Wheelabrator eliminating costly, time-consuming wire brushing, grinding and chiseling. Because of the thoroughness of Wheelabrator cleaning, welds adhere more tenaciously and final finishes are anchored in a permanent bond.

Time and cost-savings effected are usually sufficient to amortize the entire investment in from 6 to 18 months. For example, a 35% saving in cleaning weldments for automotive service equipment resulted from an installation at the Weaver Mfg. Co., Springfield, Ill.

A complete line of Wheelabrators is available for cleaning all sizes and shapes of weldments. They will produce the surface cleanliness you desire at an unusually low cost.

GET THE FACTS TODAY. WRITE FOR BULLETIN NO. 784

American Wheelabrator AIRLESS BLAST CLEANING

WHEELABRATOR & EQUIPMENT CORP.

857 S. Byrkit St., Mishawaka, Ind.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST CLEANING EQUIPMENT

120 Welding Engineers See Solar's Welding Layout

TOURING the San Diego plant of Solar Aircraft Co. recently, more than 120 southern California welding engineers saw one of the largest arrays of production welding equipment in the United States. The engineers were members of the aircraft and rocketry panel of the American Welding Society. They viewed some 275 welding installations that turn out jet engine and afterburner components, plus numerous other welding stations.

Examples of specially modified and designed welding equipment for special Solar jobs were shown to the visitors, most of whom came from aircraft and metal working plants. The special welders included automatic set-ups, special-purpose spot and seam welders, inert-gas equipment and submerged-arc fixtures.

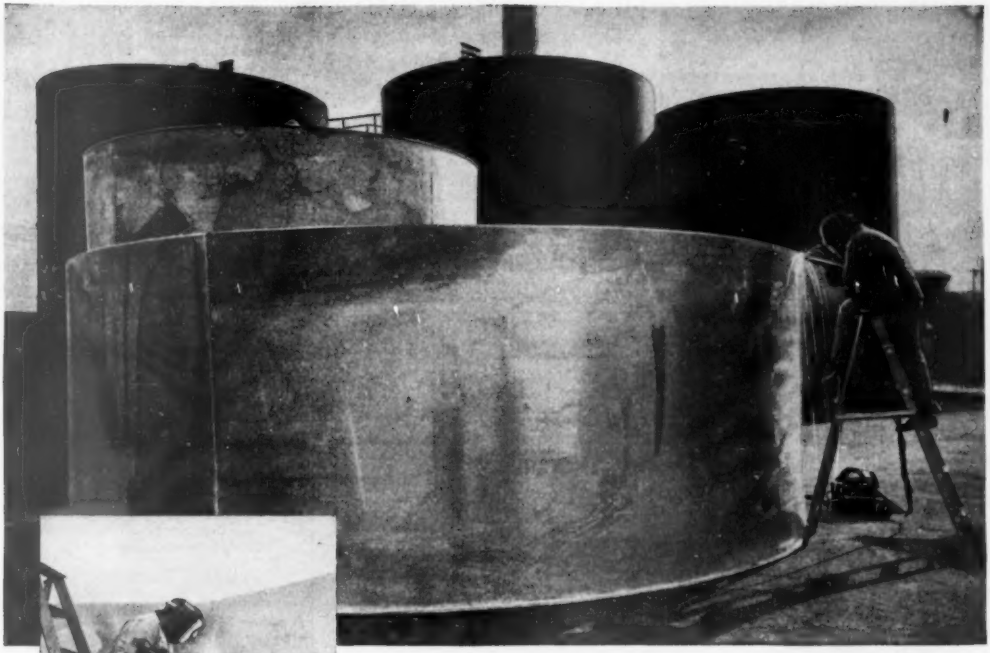
Before the tour the engineers were guests of Solar at a dinner and heard Frank Harkins, Solar's chief welding engineer, and Al Bennett, superintendent of the Solar flux department, tell about advances in stainless and alloy steel welding.

At top, above, are shown Mr. Harkins (left) and Russ Meredith, research engineer of North American Aviation, Inc., and Charles Smith (right) chief welding engineer of Douglas Aircraft Company's Long Beach plant. Meredith is the inventor of the inert-gas process, used in the Solar butt-welder the men are examining.

* * *

Here Are Meeting Dates for NWSA in 1952-53

FOLLOWING are the dates and locations for 1952-53 meetings of the National Welding Supply Association: central zone, Sept. 17-18, Hotel Pfister, Milwaukee; eastern zone, Oct. 24, Hotel Warwick, Philadelphia; west central zone, Hotel Muehlebach, Kansas City, Mo.; southeastern zone, Dec. 1-2, Henry Grady Hotel, Atlanta; southwestern zone, Dec. 5, Rice Hotel, Houston, Tex. and western zone, Feb. 5-6, Hotel St. Francis, San Francisco.



One welder. One helper. The Aircomatic Welding Process . . . and Universal Copper Works, Inc. Newark, N. J. fabricates a 50,000 gallon aluminum industrial acid tank for A. Gross & Company at a savings of 75% in filler rod and 50% in time over previous methods used.

AIRCOMATIC® WELDING *cuts costs of* "Hungry Acid" Tanks

Experts long knew aluminum was the answer for 'hungry acid' storage tanks . . . acetic, fatty acids, for example. Only a few years ago fabrication of these ideal tanks was a sizable problem.

Today that's all changed. Air Reduction's Aircomatic Welding Process has so simplified tank-building operations, that in-the-field construction has become routine practice.

Based on continuous feeding of bare filler wire in conjunction with inert shielding gases, the Aircomatic Process now presents the welder with these fabrication advantages:

1. Continuous, high-rate deposition of filler metal
2. Semi-automatic, all-position welding
3. Minimum plate-edge preparation
4. Heavy section welding with little or no preheat
5. No flux — elimination of slag removal
6. Visible arc — no blind welding

Find out how you can use Aircomatic welding. Write or phone your nearest Airco office. Ask for your copy of Catalog 17 "The Aircomatic Process". Also, inquire about Airco's film "The Tool for the Job" — the story of Aircomatic in full color.

AN AIR REDUCTION PRODUCT

AT THE FRONTIERS OF PROGRESS YOU'LL FIND

AIRCO®

DEALERS AND OFFICES IN PRINCIPAL CITIES

AIR REDUCTION

AIR REDUCTION SALES COMPANY • AIR REDUCTION MAGNOLIA COMPANY • AIR REDUCTION PACIFIC COMPANY

REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL

DIVISIONS OF AIR REDUCTION COMPANY, INCORPORATED

AMPCO-TRODE® 10
Bronze Electrodes

Weld Cast Iron
Weld Galvanized Iron
Weld Dissimilar Metals
Make Wear-Resistant Overlays
Make Corrosion-Resistant Welds
etc.

Yes, you can do a lot with Ampco-Trode 10. That's why we call this covered aluminum bronze eloctrode a general-purpose rod.

When making overlays or when bronze-welding ferrous metals, we recommend medium arc and weave beads. Amperage range is wide, because it welds a wide variety of metals. Use low side of amperage range for joining iron-base metals . . . the middle of the range for bronzes . . . the high side of the range when welding bearing copper base alloys.

The versatile utility of Ampco-Trode 10 keeps costs down, so it pays to have a supply on hand. If you want additional information call your Ampco distributor or write us.

AMPCO W-118

AMPCO METAL, INC.
MILWAUKEE 46, WISCONSIN
West Coast Plant: Burbank, California

IT'S PRODUCTION-WISE TO AMPCO-IZE!

®Reg. U. S. Pat. Off.

Midwest Welding Suppliers Meet at Milwaukee, Sept. 17-18

ALL distributors of welding equipment in the midwestern and central states are invited to the Sept. 17-18 meeting of the National Welding Supply Association at the Hotel Pfister, Milwaukee, Wis. Besides the chance to meet the most progressive welding distributors in business today, the visitor will hear many valuable suggestions on selling, warehousing, new products, training of salesmen, catalogs and delivery trucks.

Opening event of the meeting will be at 10 a.m. Wednesday, when James N. Alcock, Saginaw Welding Supply, Saginaw, Mich., central zone vice-president, will welcome delegates. The benefits of NWSA membership will be explained next by Robert C. Fernley, secretary-treasurer of the association.

Slide films of successful distributor operations will be shown Wednesday morning after Mr. Fernley's talk. Visitors will be asked to speak up with comments on the films or on similar situations in other businesses. Final discussion of the morning will instruct the delegates on the pros and cons of low-hydrogen electrodes.

Wednesday afternoon, a speaker from A. O. Smith Corp. will talk about future prospects of the welding industry. Safety products, training of over-the-counter salesmen and the relative merits of leasing versus owning trucks will be discussed by three other speakers. A general confab on standardization of catalog sheets will then be presented.

All day Thursday will be taken up by plant visits. Visitors will be taken to A. O. Smith Corp. in the morning and Ampco Metals, Inc. in the afternoon.

* * *

Handy & Harman Starting its 85th Business Year

STARTING 85 years ago as dealers in silver and gold bullion, specie and bonds, Handy & Harman is a fine example of a firm that has built its business on the development of new products and markets. The company now manufactures and supplies the arts and crafts with a large part of the sterling silver, karat gold, anodes for plating, gold and silver solders and gold and silver in special forms used in every type of manufacturing, defense and civilian production alike. The firm received six Army and Navy "E" awards during the war for outstanding production aid in silver alloy brazing methods.

Today, the company has plants in New York, Bridgeport, Providence, Chicago, Los Angeles, and Toronto, Ont.

How to beat the high cost of tungsten

With tungsten a critical defense material in short supply, and going at prohibitive prices (in the vicinity of $6.00 per pound), tungsten carbide users have been searching for a satisfactory —and more economical—hard surfacing material.

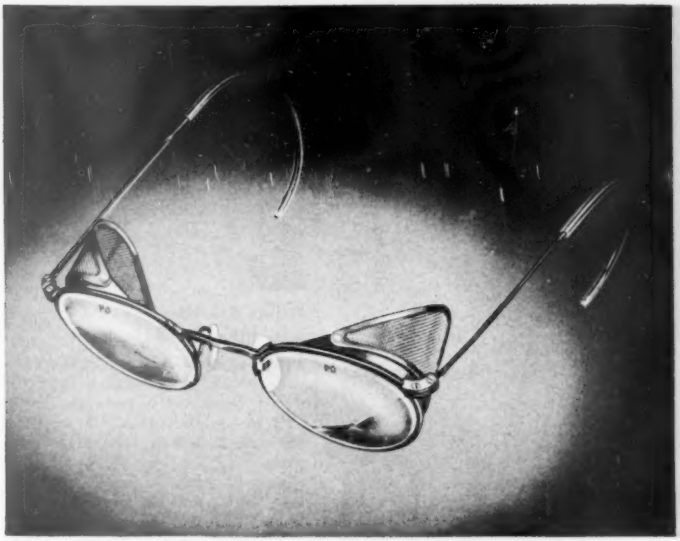
To meet this demand, we at Rankin Manufacturing Co. have developed and tested—in our own laboratory and on actual jobs in the field—the Ranite No. 4 and "C-X" hard surfacing welding rods. These new rods *when properly applied* have in many cases given equal surface protection to tungsten carbide at ⅓ the cost of tungsten carbide. Also, Ranite No. 4 and "C-X," with their lower specific gravities, cover more area per pound, thus contributing an additional saving.

Illustration shows graphic proof of Ranite claims. This picture clearly indicates that Ranite "C-X" was equal in effectiveness to tungsten carbide, and No. 4 actually outperformed tungsten in this case.

Both Ranite electrodes with Rockwell hardnesses 53-57 C scale operate on A-C and D-C with either straight or reverse polarity in all positions. Both are metallic coated and flow with typical Ranite "soft arcs," are slag-free and require no chipping or cleaning. Deposits yield a minimum, if any, porosity and will run 80% or better recovery of metal as overlay, plus assuring maximum service under highly abrasive conditions.

For detailed specifications and application procedures for both Ranite No. 4 and "C-X," write for Bulletin C-X, Rankin Manufacturing Co., 3072 West Pico Blvd., Los Angeles 6, California.

PENNSYLVANIA OPTICAL COMPANY



ANNOUNCES ITS NEW LINE OF SAFETY GOGGLES!

The 220 Series Goggles

The new 220 Series Goggles are designed to give the utmost in eye protection. Comfort is assured during continued wear by proper balance combined with lightness of weight. This results in worker approval and a higher factor of safety. Varied combinations make these goggles adaptable to many industrial operations requiring positive eye protection.

- ★ Metal construction combines comfort with strength and long life.
- ★ Designed to permit unobstructed side to side vision.
- ★ Heat treated safety lenses, individually tested for impact resistance, and examined for optical perfection.
- ★ Flat or curved lenses—either clear or absorptive green in medium, dark and extra dark shades.
- ★ Many combinations of side shields, lens sizes and bridge widths.

For illustrated folder, containing prices and detailed information, write directly to Pennsylvania Optical Co., Reading, Penna.

Order Direct and Save!

PENNSYLVANIA OPTICAL COMPANY
READING, PA.
Known for Fine Ophthalmic Products Since 1886

an ACCO product for Stainless Steel WELDING

AC-DC Electrodes

GAS Welding Rods

made by

PAGE

BURNING...
stable even at lower heats

SLAG...
clean, easily removed

COATING...
resists cracking down to very short stubs

SELECTION...
complete line for welding every type of stainless

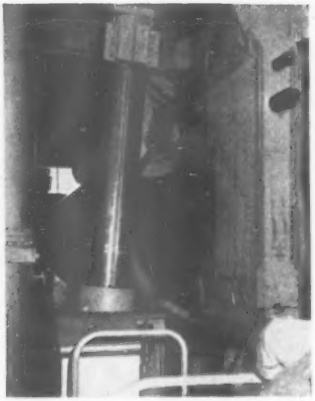
Get in touch with your PAGE distributor

ACCO

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

PAGE Welding Electrodes AND Rods



8,500-Ton Press Forms 6-in Plate in Half-Cylinder

TERRIFIC capacity of the largest vertical press and draw bench in the world was demonstrated to news men in late July at the Barberton, O., works of Babcock & Wilcox. The giant press formed a 2,200 F hot section of boiler plate 6-in. thick, 10 ft wide and 36 ft long into a half cylinder (see above photo) in just 17 minutes. Tolerances on the big cylinder were held to 1/16-in. by the crew, who operated the press by push-button control. The heavy steel plate was produced by Lukens Steel Co., Coatesville, Pa.

Normal capacity of the press is 6,500 tons though its intensified capacity is 8,500 tons. It has bending beams 42 ft long and can handle plates 42 ft long because of its open-end construction. The four supporting columns for the press are giant steel pillars 52 ft high and 26-in. in diameter, weighing 41 tons each.

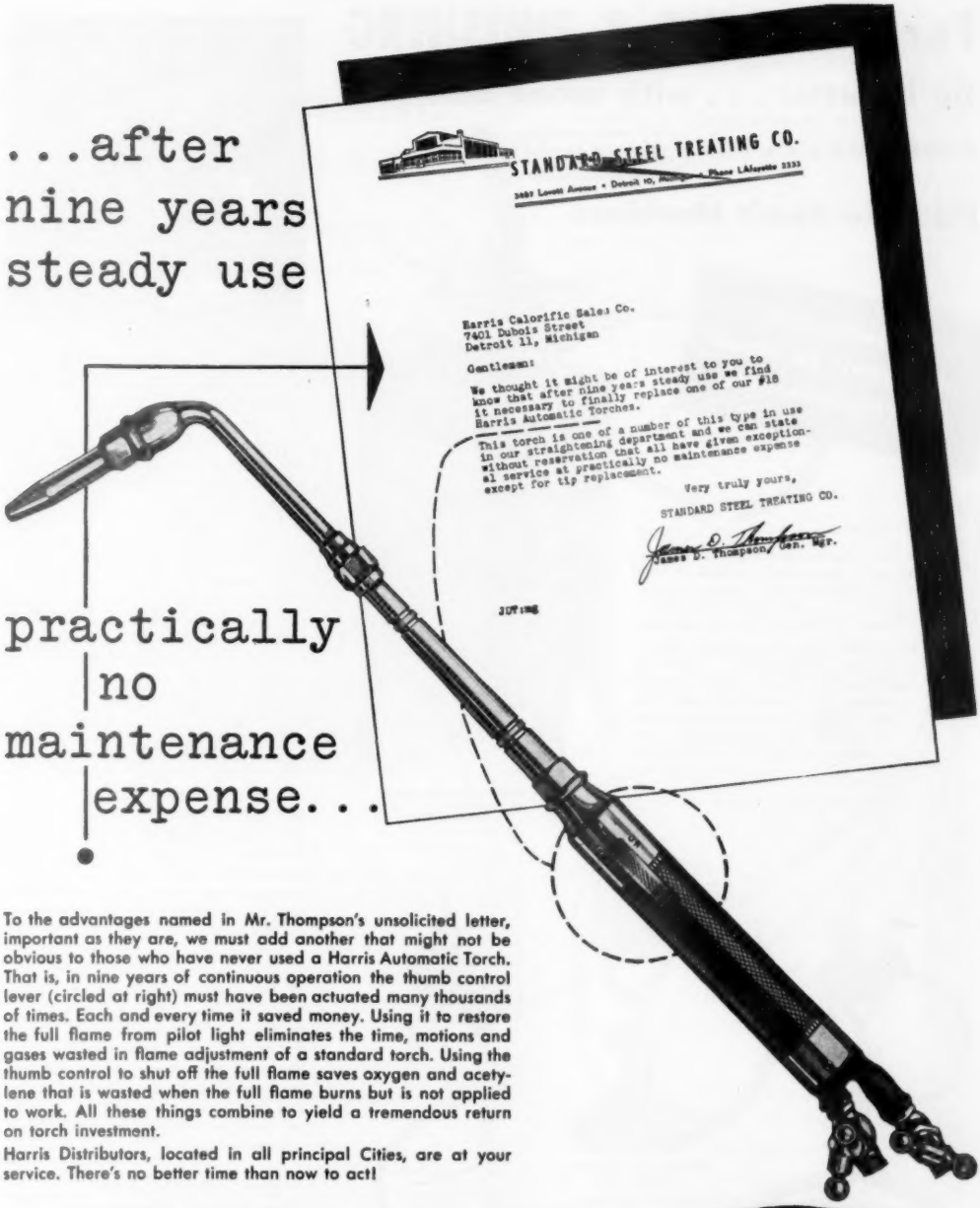
The big press is housed in a new shop building that measures 105 by 275 ft on the ground and is 92 ft high. The complete hydropneumatic pressure system of the press was designed, fabricated and installed by the Barberton Works, as was the press proper.

An alternate use of the press is to purge or forge an opening lengthwise into a heated ingot. The hollow ingot or bloom is then taken to a second piece of equipment, a horizontal draw bench and fitted over a mandrel to hold inside dimensions. The hot bloom is forced through a series of dies by the head of the mandrel to reduce the outside diameter and increase the length to proper size.

An unusual feature of the press is that it was designed and built to reduce the amount of welding necessary for heavy plate sections, but only by welding was it possible to produce such a behemoth.

...after nine years steady use

practically no maintenance expense...


STANDARD STEEL TREATING CO.
Harris Calorific Sales Co.
7401 Dubois Street
Detroit 11, Michigan
Gentlemen:
We thought it might be of interest to you to know that after nine years steady use we find it necessary to finally replace one of our #18 Harris Automatic Torches.
This torch is one of a number of this type in use in our straightening department and we can state without reservation that all have given exceptional service at practically no maintenance expense except for tip replacement.
Very truly yours,
STANDARD STEEL TREATING CO.
James D. Thompson, Gen. Mgr.

To the advantages named in Mr. Thompson's unsolicited letter, important as they are, we must add another that might not be obvious to those who have never used a Harris Automatic Torch. That is, in nine years of continuous operation the thumb control lever (circled at right) must have been actuated many thousands of times. Each and every time it saved money. Using it to restore the full flame from pilot light eliminates the time, motions and gases wasted in flame adjustment of a standard torch. Using the thumb control to shut off the full flame saves oxygen and acetylene that is wasted when the full flame burns but is not applied to work. All these things combine to yield a tremendous return on torch investment.

Harris Distributors, located in all principal Cities, are at your service. There's no better time than now to act!

THE HARRIS CALORIFIC COMPANY

Cleveland 2, Ohio

HARRIS

SERVING THE METAL INDUSTRY SINCE 1905

For GRINDING & FINISHING

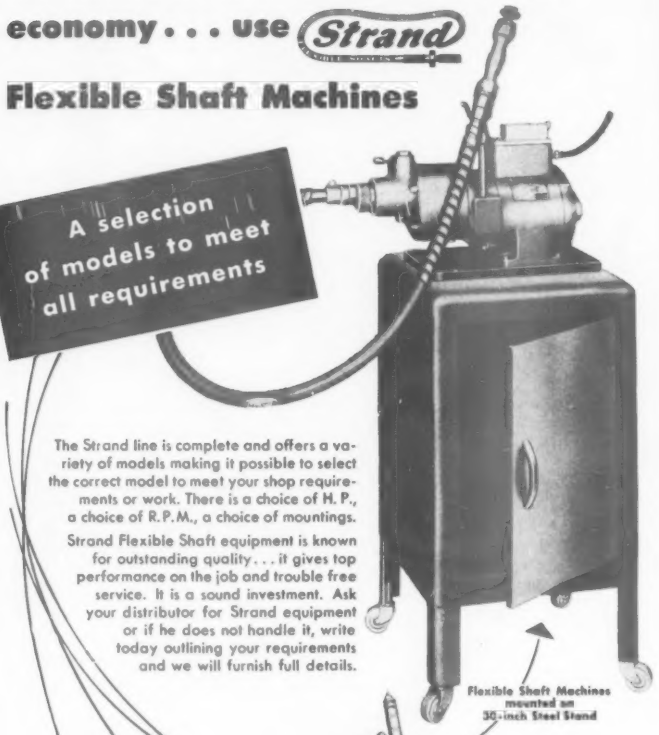
Do it better . . . with speed and economy . . . use Strand

Flexible Shaft Machines

A selection of models to meet all requirements

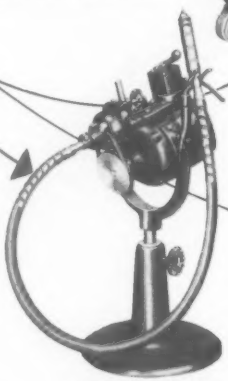
The Strand line is complete and offers a variety of models making it possible to select the correct model to meet your shop requirements or work. There is a choice of H. P., a choice of R.P.M., a choice of mountings.

Strand Flexible Shaft equipment is known for outstanding quality . . . it gives top performance on the job and trouble free service. It is a sound investment. Ask your distributor for Strand equipment or if he does not handle it, write today outlining your requirements and we will furnish full details.

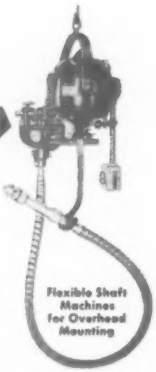


Flexible Shaft Machines mounted on 36-inch Steel Stand

Flexible Shaft Machines mounted on Swivel, Adjustable, Floor Type Tripod Stand



Flexible Shaft Machines mounted on Double Swivel Yoke Bench Column



Flexible Shaft Machines for Overhead Mounting

The Balmar Corporation
N. A. STRAND DIVISION

EASTERN SALES
Woodbury, Baltimore 11, Maryland

WESTERN SALES
5001 North Wolcott Ave., Chicago 40, Illinois

New Eutectic Division For Metal Bonding Agents

AN EXCLUSIVE agreement has been signed by the ChemoTec Division of the Eutectic Welding Alloys Corp., and the Ciba Co., Inc., to develop and market new bonding agents for joining titanium, magnesium, aluminum, ferrous alloys, glass, wood, porcelain and plastic.

Principals in the agreement were Rene D. Wasserman, Eutectic's president, seated at right above, and Dr. Harry B. Marshall, president of Ciba Co., to the left. Standing are John R. Charlton, divisional manager, Ciba Co. (left) and F. F. Roehll, Eutectic's national sales manager who now heads the newly formed ChemoTec division.

Eutectic's new division will manufacture and market under Ciba license using its basic materials and process. Many uses are foreseen for the new compounds, said to exceed the original formulas in performance. Bonding of metals in the aviation, automative and electronic fields, though now done in considerable quantity, is expected to be accelerated by this move.

The Ciba Company was founded in 1859 under the name of the Society of the Chemical Industry in Basle, Switzerland, of which Ciba is a contraction. It is famous the world over for its chemical developments. To use the new materials, it was necessary for Eutectic to train organic chemists and field chemical engineers to service inquiries and advise on production problems.

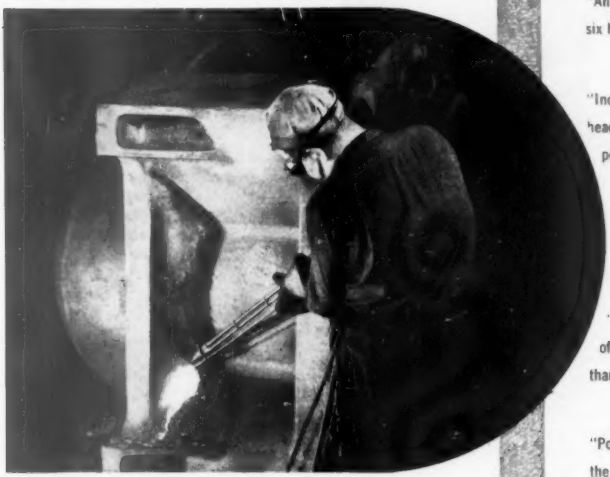
* * *

Bristol Company Makes Thin Welded Diaphragms

NEW arc welding facilities at the Bristol Company, Waterbury, Conn., are turning out welded diaphragms of very thin stainless, phosphor bronze and "Ni-Span C." The diaphrams, made from thicknesses ranging between 0.0015 to 0.005 in., go into pressure transducers, pressure elements, and seals.

POWDER-WASHING SPEEDS CLEAN-UP

Removes excess and defective metal quickly, easily, and at low cost



Cleaning-floor bottlenecks eliminated, production up, costs down, scraps and recasts negligible—that's the gist of enthusiastic reports on LINDE's powder-washing process.

Powder-washing combines the quiet speed of oxygen-cutting with a surface quality comparable to finish grinding. It removes fins, pads, sand inclusions, penetrations, burned core sand, chill bars, nails, chaplets, cracks and tears. It finishes flat or uneven surfaces to close tolerances with equal ease. And the powder-washing flame gets into places where other equipment can't.

Powder-washing can be applied to any carbon or alloy-steel casting. Equipment is simple. Technique is easily mastered in a short time.

For further details, telephone or write today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Dominion Oxygen Company, Limited, Toronto.

WHAT DO FOUNDRYMEN SAY ABOUT POWDER-WASHING?

"... powder-washing does for us in two hours what required one day of chipping."

*

"An hour of powder-washing has replaced four to six hours of grinding."

*

"Increased production and reduced labor and overhead more than make up for the cost of gases and powder consumed."

*

"... the equivalent of four days' chipping in one and one-half hours."

*

"... a casting which formerly required one hour of grinding is cleaned by powder-washing in less than five minutes."

*

"Powder-washing cleaned one casting in an hour, the other in 30 minutes. Conditioning by chipping and grinding would have taken three and two days respectively."

*

"... removed the shifted cores and penetrations with a saving of several hundred man hours."

*

"... in a few hours, cleaned up housings that otherwise would have had to be scrapped."

*

"... washed out a layer of sand from inside the cylinder in less than two hours, a job we could have done with no other available equipment."

LOOK TO Linde Trade-Mark **know-how . . . show-how . . . products and processes FOR WELDING, CUTTING, TREATING, FORMING METALS**

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

Too many reject welds?

Type 300 Oven

Automatic thermostatic control, 175 to 550° . . . holds 350 lbs. of rods (18" size) . . . safe, adequate 840 watt heater . . . completely wired for 110/220 or 220/440 volt AC . . . sturdy welded-reinforced sheet metal construction . . . insulated — low heat loss, low upkeep.

Engineers say most defects in high-strength welds — X-ray porosity, rough welds, under-bead cracking, etc. — are caused by moist electrodes. Because low-hydrogen type rods absorb moisture so fast (often within 2 hours), rejects and reworks start piling up unless you protect unpackaged electrodes from moisture.

DryRod — the original shop-tested *portable* electrode oven — safely preserves the manufacturer's "baked-in" quality . . . keeps rods within the .2% moisture limit allowed by U. S. Govt. Specifications. DryRod's *exclusive circular design* assures even heat distribution without fans — plus giving great strength with light weight. Protect yourself against costly rejects, reworks, scrap loss . . . preserve electrodes conveniently, at low cost, with DryRod. Write for free bulletin.

DryRod — always made by, and now also sold by PHOENIX
Dry Rod—Trademark

Play safe — don't risk faulty welds, scrap loss, costly reworks or production slowdown due to wet electrodes. Maintain rods at top efficiency, ready for instant use on high-strength welds. DryRod pays for itself — costs less than 10c per day to operate . . . gives you convenient storage of varying sizes and types at point of use.

Phoenix Products Co.

DryRod Electrode Oven

DryRod—always made by, and now sold by PHOENIX

WRITE FOR FULL INFORMATION

Phoenix Products Co. X-DR-6
4715 N. 27th St., Milwaukee 16, Wis.

☐ Send new bulletin DR-752 explaining how DryRod can save me money on high-strength welds

☐ Send chart showing recommended temperatures for various mineral-coated electrodes

Name .....
Company .....
Address .....
City ..... State .....

Bucket Seat Welder Speeds British Auto Output

HIGH speed automatic welding of motor car bucket seats has cut the production cost of this item by 56%, say British welding engineers. One multi-welder assembles nine components with a total of 110 spot welds to turn out a completed bucket seat in only 40 seconds.

Air-operated clamps are used on the welder which was built by Philips Electrical Ltd. This makes loading and unloading almost automatic for the operators, who save considerable time.

Spot welding electrodes are made of chromium copper for hardness and high conductivity and are hydraulically operated. Individually water-cooled, they descend upon the workpiece in a quick succession of pairs. Maximum electrode force is 450 lb at each spot.

There are six electrodes attached to each secondary, rated at 35 kva. Employing respectively 4, 8 and 17 of these transformers the three welding stations are interlocked to prevent becoming synchronized which would cause a high surge on the power supply.

The equipment for the automatic control of this complex system of electrical, hydraulic and pneumatic circuits, regulating and the timing and interaction of the operations, is mounted in three separate cubicles. Electronic program times are scheduled in the cubicles to regulate each progressive stage of welding.

Philips expects that such multi-welders will find applications in various industries where sheet metal pressings are used, such as in the making of refrigerators and perambulators.

—McGraw-Hill World News

* * *

"Take two paces, turn and fire!"

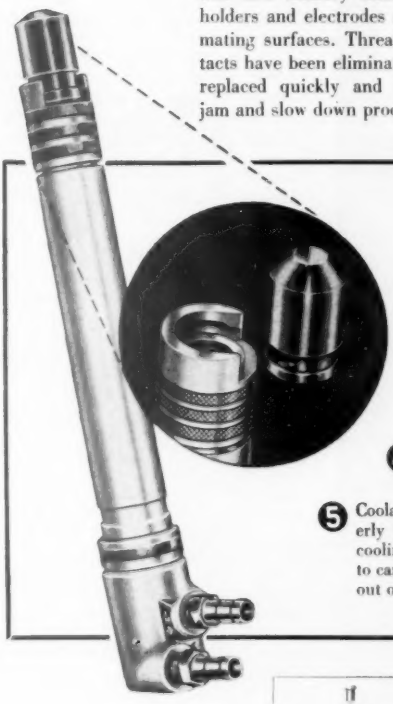
MALLORY announces the "Nu-Twist"*

. . . an entirely new approach to electrode and holder construction for spot welding pressures over 6000 pounds

The new Mallory Heavy Duty "Nu-Twist" holders and electrodes are designed with flat mating surfaces. Threaded and tapered contacts have been eliminated. Electrodes can be replaced quickly and easily . . . they won't jam and slow down production.

If you are using spot welding pressures over 6000 pounds in your plant on aircraft structures, ordnance equipment, jet engines and similar components . . . "Nu-Twist" holders and electrodes will save "down time" . . . speed production. Study the cut-away and you'll see why.

*Trademark; Patent Applied for

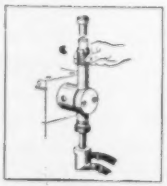


1. Manually operated locking nut requires no tools and permits fast, easy replacement of electrodes.
2. Flat, silver-plated mating surfaces between electrode and holder give good electrical contact and effectively support the highest welding pressures.
3. "O" Ring seal provides water tight seal at all times.
4. Double groove construction in locking nut positively aligns electrode in holder.
5. Coolant hole and wall thickness properly proportioned to insure efficient cooling with adequate metal section to carry higher welding currents without overheating.

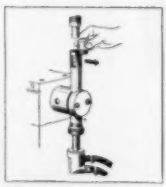
Write for your copy of Bulletin 8-17. It is just off the press and contains complete data on "Nu-Twist" holders and electrodes.

"Nu-Twist" electrodes are fast and easy to change . . .

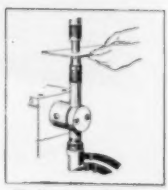
1. Shut off water and pull down coolant head.



2. Loosen locking nut.



3. Slide out old electrode . . . slide in new one.



4. Reassemble and you're ready to weld.

P.R. MALLORY & CO. Inc.

MALLORY

SERVING INDUSTRY WITH THESE PRODUCTS:

Electromechanical—Resistors • Switches • Television Tuners • Vibrators
Electrochemical—Capacitors • Rectifiers • Mercury Dry Batteries
Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

P. R. MALLORY & CO., INC., INDIANAPOLIS 6, INDIANA

140-Ft Box Girders in West Coast Bridge

THIN steel plates welded into rectangular box girders are main structural components of three recently erected western Washington State Bridges. Biggest of the three is the Portage Canal highway bridge connecting Indian Island with the mainland near Port Townsend. This bridge is a deck girder design with spans 40-ft cantilever, 170-ft, 250-ft, 170-ft and 40-ft cantilever. The 170-ft spans consists of two-cell reinforced concrete box girders which cantilever 55-ft out toward mid-channel in the main span.

The central span includes a pair of 140-ft welded steel box girders, suspended between the 55-ft cantilevers, according to *Roads and Streets*. Weight of the girders is 39 tons each and they are thought to be the longest west of the Mississippi. The girders were fabricated at the Seattle waterfront plant of the Puget Sound Bridge & Dredging Co. They were carried to the site by barge.

Erection was managed by anchoring the barge between scows supporting a 35-ton whirley and a 25-ton steam derrick. Assisted by an A-frame truck on top, lifting the first girder was accomplished in two hours.

The welded design of the girders was the work of Homer M. Hadley, Seattle consulting engineer. Manson Construction Engineering Co. of Seattle was the contractor for the state highway structure. Two smaller spans of steel box-girder design were built for King County, Washington.

One 110-ft single-span bridge with two box girders of welded design is located at North Bend on the Snoqualmie River. Its construction is described in detail in THE WELDING ENGINEER, Sept. 1951.

* * *

Westinghouse Adds New Patent Award

A NEW incentive program designed to stimulate company inventive genius has been announced by Westinghouse Electric Corp. Patent disclosure committees in the various company divisions will award a "Most Meritorious Disclosure Award" to the patent judged most worthy out of every 50 patents received. The inventor will also be paid $200. Where two or more inventors are involved on one patent, $300 will be divided among them.

This new award is the fourth on a program offered by Westinghouse to encourage active participation in improvements and developments.

When you braze aluminum...

If new rearmament contracts require that you teach inexperienced workers how to weld and braze aluminum, your local Alcoa Distributor is a good man to know.

Through him, you are offered Alcoa's complete technical service on joining aluminum—3 how-to-do-it movies, plus copies of a 186-page book covering all welding processes. He carries as well, a complete line of supplies for welding and brazing.

You'll find your local Alcoa Distributor listed under "aluminum" in your classified phone book. Alcoa sales offices are also located in all principal cities. Or write:

ALUMINUM COMPANY OF AMERICA
1943J Gulf Building • Pittsburgh 19, Pa.

ALCOA®

First in Aluminum

Abrasion costing you dollars?

—spend your pennies on

NEW **WALLEX**

ABRASION RESISTANT HARD-FACING ALLOY

Yes—WALLEX *does* cost only pennies when compared to the dollars it will save in fewer replacement parts, less welding time, and less down-time on your equipment.

WALLEX is a new hard-facing alloy made to resist the abrasion of earth moving and rough material handling and crushing equipment. WALLEX also has good impact and corrosion resisting properties. It comes as welding rods. Weldors will find it works fast—it is the easiest rod to use of its kind. Special castings of WALLEX are also available.

WALLEX is for you—to cut your maintenance costs by spending pennies instead of dollars.

ORDER FROM YOUR LOCAL JOBBER

WALL COLMONOY

CORPORATION

HARD FACING ALLOYS

19345 JOHN R STREET DETROIT 3, MICHIGAN

Write for more information on WALLEX *and other Colmonoy alloys.*

Lincoln Electric Plays Host to 8 Traveling Trainees

EIGHT men from all corners of the world recently came to this country for an extensive eight weeks' training course sponsored by Armco International Corp., Middletown, O. These Armco representatives travelled a combined total of 50,000 miles to reach the U.S.A.

During their stay, a week was spent in Cleveland studying the latest welder manufacturing developments at The Lincoln Electric Co. Lincoln officials who helped conduct the tour and study of the company's new $10,000,000 plant included A. F. Davis, Lincoln vice-president and secretary; W. R. Persons, Lincoln sales vice-president; R. Loynd, Lincoln director of training, and G. Clipsham, assistant to the president.

The trainees included: W. Cartlidge from Mexico City; Y. Mori, Tokyo; W. Young, Colombia; F. Laurie, Calcutta, India; J. Reumont, Leopoldville, Belgian Congo; A. Noe, Casablanca, Morocco; F. Zevallos, Lima, Peru and L. Tulby, Johannesburg, South Africa. Armco International Corp. is the export agent for Lincoln Electric Co.

* * *

Air Raid Precautions for Oxyacetylene Equipment

RECOMMENDATIONS for minimizing air raid damage to and from equipment using or containing oxygen, acetylene or calcium carbide are contained in a 4-page paper prepared by the International Acetylene Association. First written in 1942, this information still holds good for welding shops, plants, chemical works and other users of oxygen and acetylene. To inquire about obtaining copies, write to the IAA at 30 East 42nd St., New York City 17.

* * *

New Hibbing Warehouse for W. P. & R. S. Mars

PICTURED here is the new 9,000 sq ft warehouse of W. P. & R. S. Mars Co. at Hibbing, Minn. This will supplement the activity of the company's Duluth office and warehouse in serving the welding and industrial supply needs of the iron range country.

(His business paper . . . of course)*

With the pushing pace of business today, your business problems won't wait. That's why so many of the **Best Informed Men in your Field** take their business papers home to read. Competition won't stand still, stiff inventories won't keep, or costs stay put. New products follow each other so fast it's impossible to keep out front without reading every issue. Look through this business paper of yours . . . right now. The editors get out and cover the field for you . . . report what's happening . . . keep you posted on new products, new methods . . . the trend of the market and the times. The editorial pages give you the latest what-to-do-and-how; the advertising pages fill in on what-to-do-it-with. Read both. Read at home or on the job . . . but read every issue, straight through. That's what keeps *you* one of the **Best Informed Men in your Field.**

The business paper in your hand has a plus for you, because it's a member of the Associated Business Publications. This means it is a *paid*-circulation paper which must *earn* its readership by the quality of its editing. It is one of a leadership group of business papers that work together . . . in editorial conferences and many a study and service project . . . to add new values, new usefulness, new ways to make the time you give to your business paper still more *profitable* time.

ALL ABOUT STAINLESS STEEL— WELDING, CLEANING, BRAZING FINISHING, Etc.

•

The Welding Engineer

F77 One of a series of advertisements prepared by THE ASSOCIATED BUSINESS PUBLICATIONS

T-W HAS the DOPE on ORDNANCE

This double roll Seam Welder welds Base Plates to Projectiles. With slight modification, the welder can weld base plates to six sizes of projectiles from 75 MM to 8".

● Save days of engineering and planning—the information you need is in the T-W files. Bring your contract problems to T-W—take advantage of previous experience and collected data. T-W men can help you with your bid; show you how to approach the job; how to install the equipment and how to produce the parts. The listing at right shows a few of the items which T-W customers are producing on T-W welders. Call on Taylor-Winfield and the men who know from experience how to handle specifications covering ordnance items.

Write, wire or phone Taylor-Winfield.

A Few of the Products Made on T-W Welders

BASE PLATES ON PROJECTILES

AMMUNITION BOXES

BAZOOKA FIN ASSEMBLIES

60 AND 81 MM TRENCH MORTAR FIN ASSEMBLIES

SHELL CONTAINERS

PRACTICE AND LIVE AERIAL BOMB FIN ASSEMBLIES

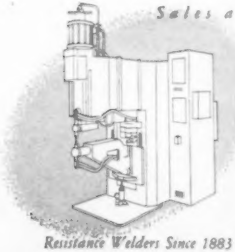
GRENADES, GRENADE LAUNCHERS

ARMOR PIERCING SHELL ASSEMBLIES

COMBAT HELMETS

BAZOOKA COMPONENTS

Sales and Service In All Principal Cities



Resistance Welders Since 1883

TAYLOR-WINFIELD
RESISTANCE WELDERS

THE TAYLOR-WINFIELD COMPANY ● WARREN, OHIO

Beauty and Efficiency Present at the Races

Miss Arlene Dahl recently took time off from her moviemaking to appear at the Indianapolis Speedway Races, where she was dubbed Queen of the 1952 races. Here she flashes a bright toothsome smile at fans and photographers in front of the Marquette Official Welding and Battery Charging Service.

This was Marquette's fifth consecutive year as the official service team for the races. This year, Marquette made over 1,000 welds and performed battery charging service for all of the 53 qualifiers and starters.

* * *

Sealed Cargo Containers Save Breakage, Stealing

Freight shipped on the vessels of the United Fruit Company's "Great White Fleet" now is specially protected by 97 big welded steel shipping containers. They generally carry small-package cargo or valuable freight and are locked and sealed at United Fruit's pier in New York. Stowed in them are goods like jewelry, watches, shoes, X-ray equipment, etc.

Each having stowage capacity of 275 cu ft of cargo, the containers are employed mainly on southbound trips from New York to Central America. Last year a total of 764 container movements were made out of New York by United Fruit. Carried in the containers were 96,793 packages, according to Dravo Corp., Pittsburgh, builder of the containers. The boxes were first bought by United Fruit in 1948, with an initial order of six. By the end of 1949 there were 25 in service. Sixty more were added during 1950.

* * *

You can't vote in November unless you register. Do it now!

Steel Plants Just Now Getting in Full Swing

A MONTH after the steel strike has ended, production is just now attaining the levels of last May. Reason for some of the delay is that coke ovens, blast furnaces, open hearths and soaking pits are designed to withstand constant high temperatures. When they cool off for long periods, in this case 54 days, the refractory materials contract, lose their structural strength and in some cases actually collapse.

Again, the interdependence of many elements in a steel plant doesn't make for fast regaining of high-level production. First, coke ovens have to be started, since coking gases are used to heat other furnaces throughout the plant. The steel framework of these ovens contracts after prolonged cooling so that repairs to doors and other apparatus must be managed.

At the same time, blast furnaces must be "babied" back into production. The normal temperature at the bottom of a blast furnace is 2,900 F. When the strike ended, the bottoms of furnaces were only at 1,000 F. The slag and metal in them had completely solidified and had to be remelted at 2,200 F before new operations could begin.

Molten iron from the blast furnaces is converted into steel in either open hearths, electric furnaces or Bessemer converters. However, Clifford F. Hood, executive vice-president of operations of United States Steel said that roughly one-third of all USS open hearths were damaged by the shutdown. In some, whole roofs collapsed and had to be rebuilt.

All these factors and many others meant that a three to four week delay before normal production could be achieved was an optimistic guess.

* * *

New Oshkosh Address for Sommerfeld Supply

A GRAND opening was held Aug. 8 and 9 at the new North Jackson Drive address of Sommerfeld Welders Supply Co., Inc., Oshkosh, Wis. Friends and customers of the firm were entertained on both days at the new plant from 2 to 5 and from 7 until 10 p.m.

* * *

Canadian Gas People Convene Sept. 15-17

THE annual meeting of the Canadian section of the Compressed Gas Association will be held at the Thousand Islands Club, Wellesley Island, Alexandria Bay, N. Y., Sept. 15, 16 and 17. No formal arrangements will be made for the entertainment of the ladies, announces the committee.

Cast Iron Mold Quickly Repaired with Bridgeport No. 192 Low Fuming Bronze Rod

This huge cast iron water-cooled mold for casting large slabs of brass had cracked at the inlet end. It was quickly repaired by braze-welding and put back into the line with minimum loss in production, without dismantling or over-all preheating.

Soundness and freedom from brittleness result in a repaired part that is often stronger than the original equipment when braze welded with Bronze Welding Rod Alloys.

Bridgeport's free booklet, "Bronze Welding Alloys," contains valuable information on the many varied applications of bronze welding, with suggested procedures and step-by-step illustrations. Write for your copy today.

"Bridgeport" BRIDGEPORT BRASS COMPANY
Bridgeport 2, Conn. Established 1865
Mills at Bridgeport, Conn., and Indianapolis, Ind.
In Canada: Noranda Copper and Brass Limited, Montreal

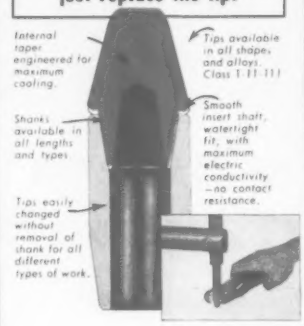
Bronze Welding Rods A PRODUCT OF BRIDGEPORT BRASS

REDUCE COSTS
with replaceable
PACIFIC SPOT WELD INSERT TIPS
fully watercooled

THE ORIGINAL AND BEST

Patent No. 2,440,463

Don't remove the shank just replace the tip!


Internal taper engineered for maximum cooling.
Tips available in all shapes and alloys. Class 1-11-111
Shanks available in all lengths and types
Smooth insert shaft, watertight fit, with maximum electric conductivity —no contact resistance.
Tips easily changed without removal of shank for all different types of work.

PACIFIC TIPS – the replaceable spot weld tips that are irreplaceable! Accept no substitutes! Gives finest performance at lowest cost . . . saves money and time . . . saves critical copper. Reduces machine down time, wear and inventory. PACIFIC shanks fit standard Morse Taper Holders. Scientifically designed for machine or portable guns . . . straight and offset holders. Fully patented. Get information and prices today.

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DALLAS, TEXAS
C. G. Wilson Co., 1501 So. Akard
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JENKINTOWN, PA.
H. F. Merchant, 808 West Avenue
LOS ANGELES, CALIF.
Pacific Electrode Co., 6230 Maywood Ave.
MILWAUKEE, WIS.
Stoffregen Sales & Eng Co., 439 W. Acacia Rd.
MINNEAPOLIS, MINN.
Progressive Welder Sales Co. of Minn., 408 Third St.
TORONTO, CANADA
F-H Welding Machines, Ltd., 43 Victoria St.
WINDSOR, CANADA
F-H Welding Machines, Ltd., 444 Pitt St.

Smith Bros. & Hughes

5304 Banks St., San Diego 10, Calif.

Manufacturers–Resistance welding electrodes and accessories . . . aircraft components . . . automatic screw machine products

Inquire for distributor and dealerships

25th Birthday For Forged Welding Fittings

JULY marked the silver anniversary of an important advance in piping history. On July 19, 1927, Tube Turns, Inc., was incorporated and forged seamless welding fittings were made available for directional changes in piping systems.

These fittings were the first of their type to be manufactured in the United States. They've made possible safer, more stronger, more efficient piping systems.

The company's general offices, main plants and engineering and research facilities are located in Louisville, Ky. A branch plant is in Los Angeles. In 1948, the company purchased the Pennsylvania Forge Corp., Philadelphia, and in that same year established a subsidiary, Tube Turns of Canada Ltd., in Chatham, Ont.

George O. Boomer is president of Tube Turns, Inc., John G. Seiler is executive vice-president.

* * *

St. Louis Firm Named P&H Welding Distributor

THE Harnischfeger Corp., Milwaukee, has announced that the General Welding Equipment Co., 2106 North Broadway, St. Louis 6, will handle the complete line of P&H arc welders, electrodes and welding positioners for the metropolitan St. Louis area.

General Welding plans to modernize its sales and show room and build an enlarged loading dock. Their service and repair department will be expanded to provide emergency and maintenance repair on all welders.

* * *

New Ampco Distributor for Dayton, O., Area

H. J. SHOCKEY and Associates, 294 Commercial Bldg., Dayton 2, O., has been appointed exclusive distributor of Ampco resistance welding products in that area. The firm will handle the complete line of resistance welding holders, wheels, dies, shafts, bushings and bars made by Ampco Metal, Inc., Milwaukee.

* * *

New Nelson Distributor

REILLY-Benton Co., Inc., 2502 Poydras St., New Orleans, recently was appointed distributor for Nelson stud welding equipment and fastener studs for southeastern Louisiana, southern Alabama and all of Mississippi. The company will offer a complete sales, rental and repair service of stud welding guns, battery and power welding units. Al Lusch, general manager of Reilly-Benton, has appointed A. A. Boudousquie as stud welding specialist on his staff.

WHERE YOU SEE THE BEST IN HARD FACING, YOU'LL KNOW REXARC DID THE JOB . . .

HARD-FACING *Rexarc* ELECTRODES

Yes, Mr. Weldor, when you see a really "sweet" piece of hard rod welding, chances are good Rexarc Hard-facing and Manganese Electrodes have been on the job!

Take a look at the smooth, even lay-down . . . the slag-free and non-porous deposits only Rexarc can give you. Easy to apply? Try Rexarc on *your* next hard-facing or build-up job. You, too, will like their ease of application . . . the quiet, stable arc and almost complete absence of spatter loss. Like thousands of weldors from coast to coast, you'll say, "Outstanding is the word for Rexarc."

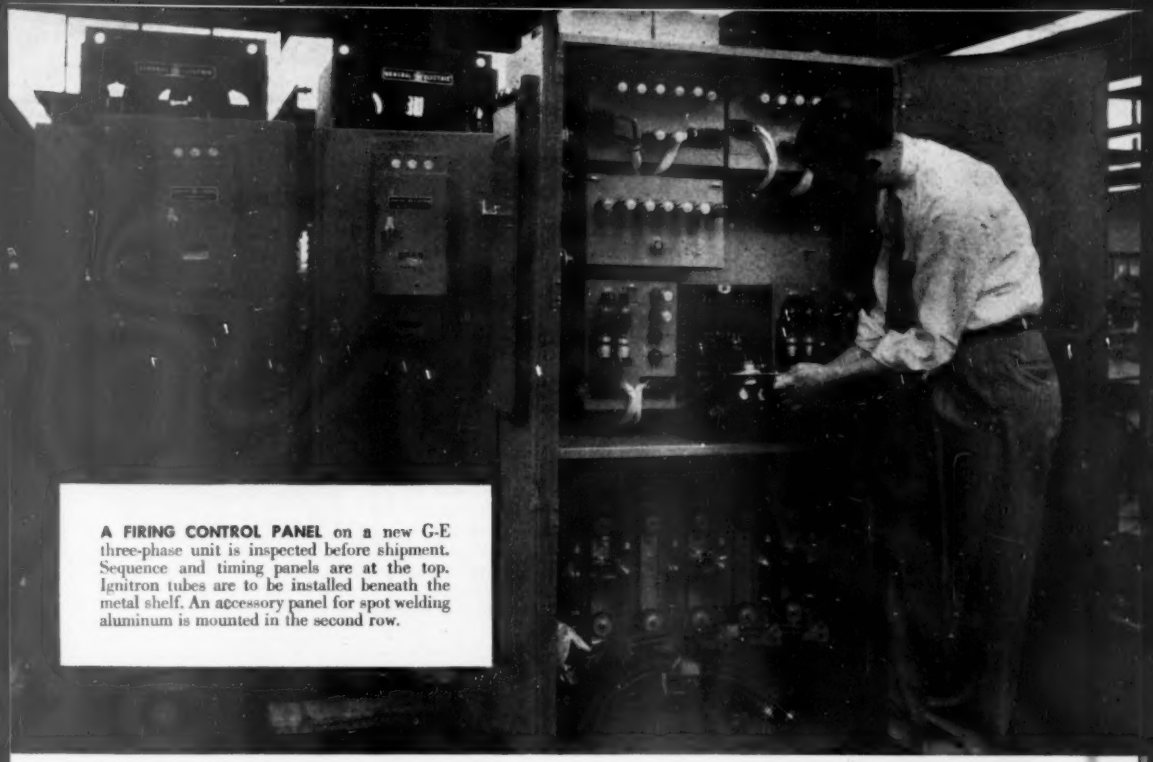
Your Rexarc Distributor will be glad to give you a demonstration. Call him today. If you would like his name, we'll be pleased to send it to you.

REXARC IS A PRODUCT OF

THE SIGHT FEED GENERATOR COMPANY

West Alexandria, Ohio, U.S.A.

Manufacturers of Welding Equipment For More Than 25 Years



A FIRING CONTROL PANEL on a new G-E three-phase unit is inspected before shipment. Sequence and timing panels are at the top. Ignitron tubes are to be installed beneath the metal shelf. An accessory panel for spot welding aluminum is mounted in the second row.

New Maintenance and Modification Features on G-E Three-phase Resistance Welding Control

The picture above shows the new G-E three-phase sectionalized control with hinged panels for each control process, permitting quick inspection and servicing. To you, this new G-E control means:

DEPENDABLE OPERATION

The new G-E three-phase resistance welding control provides lower maintenance because just one relay on the main panel operates each time the solenoid valve relay operates. All resistors, transformers, capacitors, and other components are conservatively rated for long life.

VERSATILE DESIGN

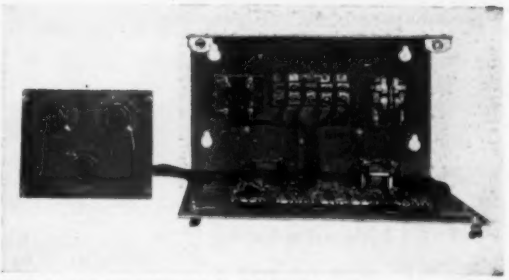
Circuit points are easy to reach. There is room in the cabinet for accessories or modifications when job requirements change. For example, if you are changing from welding $\frac{1}{32}$-inch to $\frac{1}{4}$-inch or thicker metal, you can get the added power simply by changing Size C ignitron tubes to Size D. A special kit is available containing the larger bus bars that can be quickly installed by your own service crew.

SERVICE FACILITIES NEAR YOU

Factory-trained G-E service engineers are on call 24 hours a day. There is one in your area ready to help you keep production going.

For more information on G-E three-phase welding control, fill out and send in the attached coupon today. General Electric Company, Schenectady, New York.

GENERAL ELECTRIC



A SEAM-WELDING AUXILIARY PANEL, like other panels, is easily mounted in the cabinet because of keyhole mounting slots. Spade terminals are easily connected to the terminal boards on the main panel. Dials are mounted on front of cabinet.

General Electric Company
Section A 645-56
Schenectady, New York
Gentlemen:

Please send me bulletin GEC-491 on G-E three-phase welding control. I would like to have this for:

☐ reference material ☐ an immediate project

NAME .....

COMPANY .....

ADDRESS .....

Put resistance welding costs on the SPOT!

Use AMPCO WELD® holders to reduce downtime, step-up production

There's an AMPCO WELD® holder for every resistance-welding job — offset ejector holders, straight ejector holders, universal ejector holders. All are leak-proof. Made of high-conductivity Ampco Bronze alloys, they meet or exceed RWMA specifications to give you trouble-free operation, longer runs, reduced downtime, and increased output.

. . . AMPCO* Engineering Service when you need it

Behind the famous AMPCO WELD® line of resistance-welding products is a corps of experienced engineers, ready to help you solve your problems. Just get in touch with us.

AMPCO METAL, INC.
AMPCO
MILWAUKEE 46
WISCONSIN
MW-2
West Coast Plant, Burbank, California

It's production-wise to Ampco-ize!

*Reg. U. S. Pat. Off., Ampco Metal, Inc., Milwaukee

BOOK REVIEWS

Engineer's Handbook

HANDBOOK OF ENGINEERING FUNDAMENTALS, Second Edition. Edited by Ovid W. Eshbach. Published by John Wiley & Sons, New York, 1952. Simulated leather; 5½ by 8½ in., 1,324 pages. Price $10.

To cover the myriad developments and changes in the many branches of engineering technology since Dean Eshbach published the first edition of this book in 1936, he enlisted 39 distinguished engineers and scientists to aid him in this revision.

So extensive have been the changes that it is impossible to pin point them all, but it can be safely said that the discussions on mathematics, thermodynamics and fluid mechanics have been thoroughly rewritten and revised. New material has been added to sections devoted to electricity and magnetism, engineering materials and engineering law. A new section has been added dealing with aerodynamics.

This popular reference book is divided into 14 parts, opening with a section on mathematical and physical tables. Next come sections on mathematics; physical units and standards; mechanics of rigid bodies, mechanics of deformable bodies; mechanics of incompressible fluids; aerodynamics; engineering thermodynamics; electricity and magnetism; radiation, light and acoustics; chemistry, metallic materials; non-metallic materials and engineering law. To make the book more useful than most, there is a 52-page index.

* * *

Electronics

PROCEEDINGS OF THE NATIONAL ELECTRONICS CONFERENCE — 1951, Volume 7. Published by National Electronics Conference, Inc., Chicago. 1952. Cloth, 6 by 9 in., 736 pages. Price $5.

This volume contains all the papers or digests of them presented at the 1951 National Electronics Conference. A total of 79 papers covering all phases of electronics are given. The volume opens on a general chapter of electronics for defense and carries into such subjects as electronic research, development and applications of audio systems, components, computers, high frequency measurement, information theory, medical and industrial applications of electronics, circuit analysis, magnetic amplifiers.

Much of the material, which is highly technical, is supplemented by graphs, charts, tables and pictures.

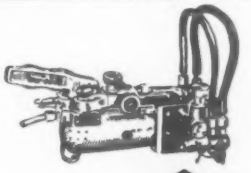
Robinson Crusoe

needed three months to make his umbrella or a spade. But he had plenty of what is our most precious commodity: Time!

To save time, to use efficient machines instead of expensive manual labour is the most urgent problem of the present day. The small MINIMOR cutting machine, developed by Weberwerke to supplement their range of stationary and mobile oxygen cutting equipment, is suitable for all such work which it has hitherto been possible to do only slowly and inaccurately with hand cutting torches.

Its light weight (11 lb.) and small size (like a briefcase) render the MINIMOR ideal for such outside work as on building sites, storage dumps, and also for work in the small modern workshop. It is robustly built and becomes in the hands of a trained operator a most valuable item of equipment. The MINIMOR is an essential price-reducing factor in all costing calculations; it produces

perfect work in half the time!



MINIMOR

WEBER WERKE SIEGEN WESTF.

GERMANY

Whatever your business is, chances are there's *one* K-G *Special* outfit that will take care of *all* your welding and/or cutting requirements.

K-G *Specials* feature such proven K-G equipment as the M38 Cutting Torch, AP Torches and APM Torches. Each includes K-G Torches, One or Two Stage Regulators, "Siamese" hose, wrenches, goggles, tips, lighters, etc., according to your particular needs. Some are welding outfits, some cutting outfits, some combination outfits. All are *complete*—there's nothing else to buy—everything you need is in *one* package!

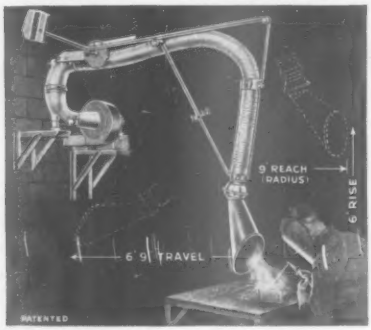
Ask your K-G Distributor about the new K-G *Special* designed for *you*. Or, write to us.

The K-G Equipment Company (Inc.)

Dept. A, 1744 Lehigh Street, Allentown, Pa.
A Unit of Air Products, Inc.

RUEMELIN Fume Collectors

Welding without ventilation. Note smoke and gas clouds.



(Right) Welding with Ruemelin Fume Collector.

REMOVE WELDING FUMES at the Source!

Ruemelin Fume Collectors remove smoke, gas and welding heat. Keep the shop air clean. Efficient and practical. Maximum coverage in welding areas. Your welders work better with this equipment in use. Write for bulletin 37-D describing all models.

Long reach collector extends working range of hood to 15 ft. or 18 ft. operating radius. Double swivel permits hood to work in 360° circle for full coverage.

RUEMELIN MFG. CO.

Manufacturers and Engineers SAND BLAST AND DUST COLLECTING EQUIPMENT
3880 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

A 5896-½

Comfortable Eye Protection is Yours

with WATCHEMOKET eye SAVERS

TUC-AWAY WELDER'S GOGGLE

There's no need to sacrifice comfort for safety. Get *both* with Tuc-Away Eye-Savers. It's the ideal flash goggle for under-helmet use and other glare and impact hazards! Light weight plastic frame and welded "telescoping" temples assure light, comfortable fit. 3 plastic change-around lenses are available to give *sure* protection from all types of eye hazards. Order from your welding (or safety) supplier or write direct.

FREE! *Send for magazine article giving impartial advice on best uses of plastic eye protection. Eye-Savers catalog also included.*

WATCHEMOKET OPTICAL CO., INC. DEPT. 5, PROVIDENCE, R. I.

Producers and Originators of Practical Plastic Eye Protection

About People

EDISON L. WHEELER, (photo at right) of Wheeler Protective Apparel, Inc., was recently elected president of The Industrial Safety Equipment Association. Other officers elected at the meeting were S. C. HERBINE, Willson Products, Inc., vice-president; J. B. DAVIES, Mine Safety Appliance Co. and F. R. DAVIS, JR., Davis Emergency Equipment Co., trustees. J. A. BREWER, Industrial Gloves Co. and G. M. GLIDDEN, Acme Protection Equipment Co. carry over as members of the board while CHARLES H. GALLAWAY, American Optical Co., ISEA president for the past two years, continues as a member of the board for another year. In addition, Mr. Gallaway has been elected to the board of directors of the National Safety Council, to serve as liaison between the ISEA and the Council

* * *

RAY A. MENTAL is now vice-president and general manager of Republic Hardfacing Corp., Bedford, O. He was previously with Perfection Stove Co. GORHAM W. WOODS has joined Republic as engineer, and will be in charge of the industrial hard-facing division. For the past seven years, Mr. Woods was development engineer for Lincoln Electric Co., where he helped develop its hard-surfacing program. An engineering graduate of Rice Institute, he joined Hughes Tool Co. where he worked for 21 years on the engineering staff on problems of metal wear. He is a registered professional engineer in Ohio, and is active in the AWS.

* * *

ALLEN B. HARVEY has joined Pacific International Products, Inc., San Marino, Calif. as New York representative for distribution of Pacific valves and equipment for compressed gases.

* * *

PAUL DISERENS, director of research and development of Worthington Corp. and its subsidiaries, has retired after 43 years of service. He will continue to serve as technical consultor in engineering and research.

Take the problem out of welding problem steels!

Use P&H Low-Hydrogen Electrodes

The right low-hydrogen electrode for your job!

70LA-2 (E6016, E7016)
General-purpose electrode for high-carbon, low-alloy, high-tensile, and high-sulfur free-machining steels.

70LB (E7016)
For repair welding of Grade B and other castings of similar analysis.

P&H .25C (E7016)
For castings repair where high carbon is preferred to alloys for raising tensile strength.

75LP (E8016)
For 2% to 3% nickel steels, both cast and rolled.

80LP (E8016)
For chrome-moly power piping and fittings.

90LE (E9016)
For higher-analysis chrome-moly power piping and fittings.

P&H .40C (E9015)
For .40 carbon castings and rolled steels where you want to match both chemical and mechanical properties.

AW2B (E9016)
For repair welding of cast armor, "off-analysis" steels, rerolled rail steels, and high-sulfur steels.

P&H # 7 (E9016)
For repair welding of Grade C and other castings of similar analysis.

90LH-2 (E10016)
For alloy steels, such as SAE 8630, 4130, and comparable types where the weld metal must match the heat-treating properties of the parent metal.

P&H # 12 (E10016)
For difficult fabricating jobs involving high-tensile and alloy steels with little or no preheat.

P&H # 17 (E12016)
For high-hardenable steels subject to high impacts through a wide temperature range.

P&H # 21 (E15016)
For aircraft and similar steels, such as 4340 and 4130.

. . . . and get high-strength welds that are free of underbead cracking

P&H has the most complete line of low-hydrogen electrodes in the industry — many "custom-made" to match the chemical analysis or heat-treating properties of a variety of alloy steels. This wide selection eliminates the difficulties in welding problem steels, such as high-sulfur free-machining, high-carbon, low-alloy, and high-strength steels.

The core wire of these electrodes is of a mild steel or a low alloy, thereby greatly reducing the cost of the low-hydrogen electrode, as compared to the higher-alloy types.

The coating ingredients of these P&H electrodes are mineral- and also hydrogen-free, with low moisture content. This eliminates underbead cracking and permits the welding of "difficult" steel with little or no preheating.

Other important advantages are: Better impact properties through a wider temperature range; Greater ductility at high tensile strengths; High-quality X-ray; As-welded properties that approach values ordinarily obtained only after stress relieving; More accurate control of alloying elements; No need for annealing before enameling; Higher heats for higher deposition rates.

Get better welds on "difficult" steels — cut your costs. Get P&H Low-Hydrogen Electrodes from your P&H representative or local distributor.

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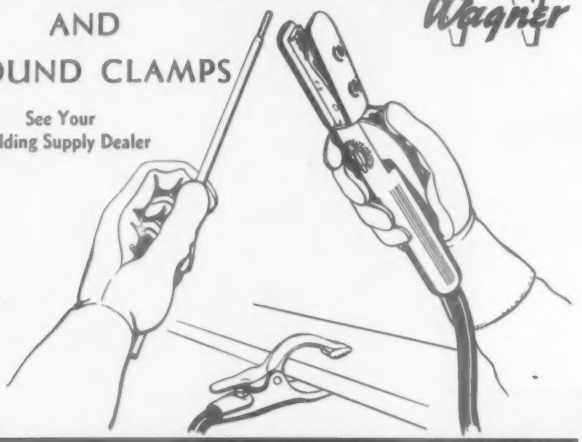

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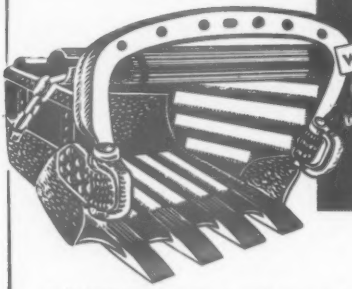

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SOLE PRODUCERS 92 N. J. RAILROAD AVE. NEWARK, N. J.

GERALD SHOSKEY will head up a newly formed safety division for Saginaw Welding Supply Co., Saginaw, Michigan. Mr. Shoskey will specialize in distribution of protective clothing, face and head protection equipment and other safety appliances. He will cover the central and northeastern Michigan area.

• • •

JOHN R. MORRILL has become a partner and general manager of Gibson Welding Supplies and Inland Oxyacetylene Co., Inc., Spokane, Wash. He was a sales executive of The Lincoln Electric Co., Cleveland, for eleven years and for the past two years has been vice-president of the Baker Raulang Co., Cleveland. Gibson Welding Supplies is a ranking supplier of welding equipment in the Northwest Inland Empire.

• • •

DR. C. J. BREITWIESER was recently promoted to director of engineering of P. R. Mallory & Co., Inc., Indianapolis. He was previously the executive assistant to Dr. F. R. Hensel, vice-president in charge of engineering. In his new position, Dr. Breitwieser assumes direct responsibility for the company's central research laboratories and general engineering staff.

• • •

S. S. BRUCE, JR. and J. S. STEVENS were appointed eastern zone managers of the railroad department of Air Reduction Sales Co. Mr. Bruce's headquarters is at Philadelphia, and Mr. Stevens at Waycross, Ga.

• • •

WALTER S. SCHAMEL has been appointed district manager of the Los Angeles office for American Wheelabrator & Equipment Corp. He has opened new offices at 3155 Leonis Blvd., Vernon, Los Angeles, and will handle the company's complete line of products, including dust collectors, abrasive blasting machines, etc.

• • •

RALPH H. SMITH was elected president of the American Welding Society's Arizona section. Other officers are J. AUGUST RAU, vice-chairman: CHARLES FOGWELL, second vice-chairman; WALTER E. RILEY, secretary; and F. MORRIS ASPEY, treasurer. Directors are EDWARD ALLISON, JOHN DYER, WILLIAM GARLAND, and PHILLIP BINKLEY.

For **TOUGH** Jobs ...use the **AO 5X272 (and 5X273) HEAVY DUTY WORK GLOVE**

You're looking at two pairs of the strongest, staunchest work gloves money can buy. They're made expressly for tough jobs. What's more, a customer test of hundreds of dozens of pairs proved they can take several dry cleanings without loss of flexibility and with practically no shrinkage. Your nearest AO Safety Products Representative can supply you.

QUICK FACTS:

- Palm of heavyweight, chrome-tanned side-split cowhide — canvas back
- Wing thumb — a feature used only on the finest type of work glove
- Heavyweight palm lining for extra wear and protection
- Reinforcing welt strengthens thumb crotch seam — the only seam exposed to work area
- Continuous palm (an AO quality feature) whereby palm and thumb are extended down the cuff a distance equal to standard pull patches. Elimination of pull patches avoids uncomfortable seams, increases work area
- Canton fleece forms back of glove
- Leather tips on back of fingers
- "Cufflex" cuffs heavy tape bound for protection and reinforcement of edges
- 2" cuff on 5X272, 4" cuff on 5X273; otherwise gloves are identical

AO's Industrial Vision Program *increases* production, *decreases* accidents. *Write today for free booklet "Improved Industrial Vision"* to 87 Vision Park, Southbridge, Mass.

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GENE WEDEREIT, director of advertising for Tube Turns, Inc. and Girdler Corp., Louisville, Ky. was elected president of the National Industrial Advertisers Association for the 1952-53 term at the NIAA convention in Chicago. Retiring president was J. F. APSEY, JR., advertising manager for The Black & Decker Mfg. Co.

* * *

HARLEY W. BESLOCK has been appointed general manager of Atlas Welding Accessories Co., Detroit. He came with Atlas in the firm's early days and has held various posts throughout the organization. He served in the armed forces during the war and was assigned to sales afterwards. His work will be under J. C. Honhart, president.

* * *

G. T. VAN ALSTYNE has been appointed director of advertising and publicity for Air Reduction Co., Inc. GEORGE M. WORDEN, recently with Hill and Knowlton, Inc., rejoins the company as assistant to the director. A. V. SCHERER will succeed Mr Van Alstyne as advertising manager of Air Reduction Sales Co. HENRY W. BECK will take Mr. Scherer's place as advertising manager of the Ohio Chemical & Surgical Equipment Co. division of Airco.

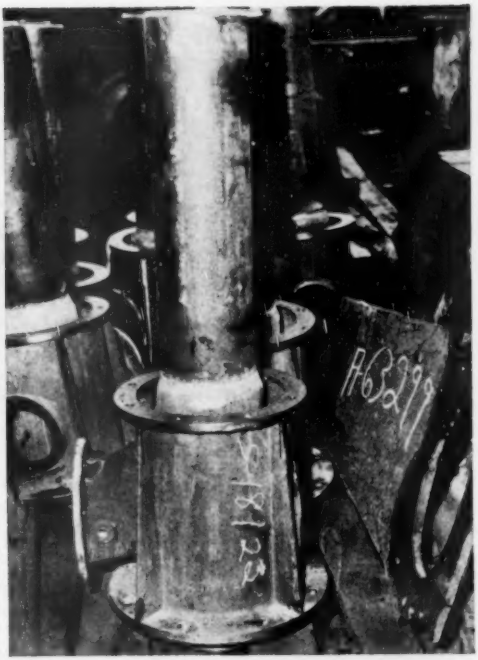
* * *

DR. SOREN H. MORTENSEN, chief electrical engineer for the power department of Allis-Chalmers Mfg. Co., and his assistant, FRASER JEFFREY, have retired. Both men are pioneers in the electrical industry and known for their numerous technical writings and appearances before engineering groups. Each is a fellow and life member of the American Institute of Electrical Engineers. An honorary degree of doctor of engineering was conferred on Mortensen in 1944 by the Illinois Institute of Technology. In 1945, he was awarded the Lamme Medal of the American Institute of Electrical Engineers.

* * *

HUGH H. HURLEY will head up a new Railroad Welding Advisory Service inaugurated by Eutectic Welding Alloys Corp., Flushing, N. Y. Mr. Hurley is an authority on welding problems common to railroading.

HOW ...to weld Ductile Iron



This large diameter Hydrafuge gives all of the advantages of welded construction. A sound weld . . . in less time, with less trouble . . . means more production at less cost. It's done with Ni-Rod "55", the ideal electrode for welding Ductile Iron to steel pipe.

DUCTILE IRON is a new type iron . . . with greater toughness, higher tensile strength and better weldability.

The commercial types (with tensile strengths ranging between 65,000 and 105,000 psi) can be readily welded to each other or to dissimilar metals such as carbon steel or alloy steels.

How? With Ni-Rod "55"®... the recommended electrode for any Ductile Iron welding job.

And for the best weld here's the procedure: clean off all oil, grease and dirt. Grind off "skin." Bevel edges. Pre-heat to about 600° F. when pressure-tight joint is required. Weld with lowest possible current that gives smooth operation.

For welding in flat position, 3/32" electrodes take 60-70 amps, 1/8" take 90-100 amps, 5/32" take 120-130 amps, 3/16" take 140-150 amps. Lower currents for out-of-position welding.

Heating should not be concentrated in one area. Use intermittent bead method to heat evenly. Peen gently with a round-nosed tool. Then cool off weld area slowly by covering with asbestos or other insulating material.

A sound weld? Yes... just as sound as the Ni-Rod "55" weld on the Hydrafuge Casting shown above. In this case the ability of Ni-Rod "55" to produce a solid joint between Ductile Iron and carbon steel made available all of the advantages of welded construction.

Do Ni-Rod "55"'s weldability and Ductile Iron's engineering properties offer an opportunity to improve production (or repair, or salvage) in your plant? Then consult INCO's Technical Service Section. They will be glad to help with any questions you may have about welding Ductile Cast Iron.

It will also pay you to anticipate your needs for Ni-Rod "55" and the other Nickel and Nickel Alloy products. Today's defense demands mean extended deliveries. So always order well in advance of work schedules.

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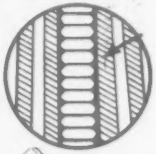

U.S. Patent No. 2,429,581
In Canada 1948

The exclusive circle design found only in Wypo Cutting and Welding Tip Cleaners provides as many as 60 more cleaning edges per inch of cleaner. Straight sided valleys, another outstanding feature of Wypo Tip Cleaners, insures a thorough cleaning and removal of all waste.

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Use 1200 Flux for silver brazing Brass, Stainless Steel, Bronze, Nickel-Silver, Steel, Monel, Inconel, Nickel and Cast Iron. Furnished in ½ lb., 1 lb., 5 lb. and 30 lb. containers.

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HELMUT THIELSCH, formerly of the Welding Research Council, has been appointed to the position of Director of Applied Welding Engineering at Eutectic Welding Alloys Corp., Flushing, N. Y. Mr. Thielsch spent the past three years in charge of preparing critical correlated literature for research investigators and interpretive engineering reports for practical engineers. In the past, he has been Secretary of High-Alloys Committee, Welding Research Council; Research Engineer at Lukens Steel Co.; metallurgist with Black, Sivalls, Bryson, Inc.; and research man at Allis-Chalmers. He is a member of the American Welding Society, American Chemical Society, American Society of Metals, Eta Kappa Nu, and Sigma Chi.

• • •

CHESTER M. ADAMS was named general manager of the Bridgeport Brass Co. to direct sales of all products. GEORGE H. BALDWIN, former sales manager of mill products, has been made assistant general sales manager. RICHARD L. ALLEN succeeds Mr. Baldwin as sales manager of mill products for both the Bridgeport and Indianapolis plants of the company.

• • •

ARTHUR M. WATSON has joined the firm of Smith Bros. & Hughes in San Diego. A member of AWS, he is well known in Detroit and Chicago areas.

• • •

EDMUND PFEIFER has become New York district manager of sales of Lukens Steel Co.

• • •

Died . . .

WALLACE TENNEY MONTAGUE, vice-president of Norton Co., Worcester, Mass., died on July 30. A director of the Grinding Wheel Institute at the time of his death, and former board chairman of both the Grinding Wheel Manufacturers Assoc. and the Abrasive Grain Assoc., he was an outstanding leader in the abrasive industry.

• • •

CHARLES CARL CARR, who retired in 1949 as director of public relations and advertising for Aluminum Company of America, died of a heart attack July 29. He was at St. Petersburg, Fla., where he has resided since his retirement.

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Loyalty to a Principle!

When the late Otis L. Smith founded Weldit, Inc., in 1918, he was determined that the basic policy of the new company would be to produce the finest precision welding products in the world. This policy throughout the years has become an inheritant part of every Weldit product. This loyalty to a principle has made Weldit torches synonymous with quality throughout industry.

Weldit *Weldimatic* torches will do a better job . . . faster . . . at less cost than any other torch.

***Weldimatic* natural action!**
To light—squeeze, to shut off—release grip.

Illustrated, WELDIT Model W-46 *Weldimatic* Welding Torch.

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DIVISION OF THE BURDETT OXYGEN CO., CLEVELAND, OHIO

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Write on your company letterhead for a generous sample stating which FLUXINE Flux you desire.

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No. 4 FLUXINE, in powder form, for welding cast iron with bronze rods.

No. 7 FLUXINE for welding all types of aluminum.

No. 18C FLUXINE for gas welding of stainless steels and inconel and nickel chrome alloys.

No. 41 FLUXINE used with high-melting silver solders on copper and its alloys and on steel.

No. 42 FLUXINE used with Westinghouse Phos-Copper rods and low-melting silver solders on copper and its alloys.

No. 43 FLUXINE . . . non-glaring . . . used when low-melting silver solders are specified. No injurious fumes. Goes further than most fluxes.

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FLUXES TO JOIN ALL METALS

NEW PRODUCTS

(Continued from page 56)

Portable 1,000 F Oven

262 A NEW portable electric oven for preheating, stress relieving, baking, drying, etc., is equipped with an Inconel sheathed sealed tubular heating element. The Model HT-2 features a thermostat control with temperature range of 300 F to 1,000 F.

Construction is heavy gage steel with a minimum of 4-in. of Fibreglass insulation. Interior of the oven is stainless steel. Two or more ovens can be used in a group or bank since they are built to nest on one another. Size is 30 in. wide by 25-in. deep by 24 in. high outside. Inside dimensions are 22 in. wide by 18 in. deep by 16 in. high. Power source is 220 volt, single phase.

GRIEVE-HENDRY CO., INC., Chicago 22.

* * *

New Safety Goggles

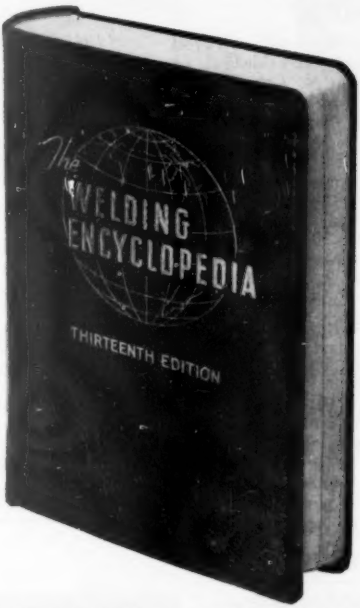
263 CALLED the "220 Series Goggle," a new industrial spectacle-type eye protector has a sturdy metal frame to support the lens at the right angle but close to the face for added protection and to provide a wide field of vision. Unobstructed side vision is achieved by placing the temples above the line of sight. The bridge is strengthened by joining the eye wires at four points to evenly distribute any stress over a wide area.

The goggle is available with curved or flat standard 47 m.m. or 44 m.m. clear or absorptive safety lenses. Side shields of wire mesh, leather, or clear or green acetate are interchangeable and easily attached.

PENNSYLVANIA OPTICAL CO., Reading, Pa.

ORDER NOW

13th EDITION OF



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200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
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Galvanizing Alloy

264 REPLACING burnt-off galvanized protection on welded galvanized parts is easy with "Galvalloy" compound, says its manufacturer. All that is necessary is to rub the 14-in. long "Galvalloy" bar on the heated section. The special alloy melts off and bonds to the surface permanently. It cannot be burned off once it is applied, it is claimed. Temperature of the base metal should be 600 F for best results. Manufacturer says the alloy will bond to steel, aluminum magnesium and pot metal.

METALLOY PRODUCTS CO., Los Angeles 54.

* * *

Idler Rebuilding Aid

265 A LOW-COST "Mir-O-Col 45-90 Method" for rebuilding tractor and shovel rollers, idlers and rails combines the best properties of two welding wires. It utilizes the good impact resistance of the company's No. 45 wire with the superior abrasion resistance of No. 90 wire to make a build-up having high wear resistance.

The impact-resisting wire has a high nickel content to withstand heavy blows and can be used in multiple-pass operations with no spalling. Hardness of deposit is from 22 to 28 Rockwell C. The abrasion-type wire contains chromium, molybdenum and vanadium and a Rockwell C scale hardness of 46 to 48.

To go with these two automatic welding wires, the Mir-O-Col company has developed new automatic welding heads and positioners. A 12-page brochure is available when requested on business letterhead.

THE MIR-O-COL CO., INC., 340 N. Avenue 21, Los Angeles 31.

* * *

Piping Leak Detector

266 A SPRAY-ON material is proving handy in checking for leaks on piping systems. After compressed air is applied to the system being checked, "Leak-Tec" is sprayed on suspect joints. If there are leaks, durable and lasting bubbles are blown up to attract the inspector's eye. The compound is furnished in flexible, plastic bottles.

CARGILLE SCIENTIFIC INC., New York City 6.

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Quick setting double-action clamp grips work more securely. Holds irregular and off-parallel surfaces as well as flat work due to pincer action. Easily tightened in cramped areas.

4 SIZES: 2½" TO 6" OPENING

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Famous GRAND "C" Clamps

Alloy Steel (Stronger than forged) Spatter-Proofed Screws, Deep Throat—Replaceable Swivels

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L SERIES	ASM SERIES	ASH SERIES
8 SIZES 2" TO 12"	7 SIZES 4" TO 18"	6 SIZES ¾" TO 12½"

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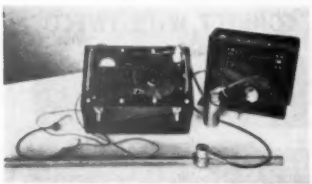
X-Ray Film Tank

267 DARKROOM congestion in industrial X-ray departments can be considerably relieved with the new GE stainless-steel pass-tank. The X-ray film can still be processed in safety in the dark, but other supplies, films and equipment can be kept on the other side of a wall in good light. This makes possible the viewing of wet films, loading and unloading of driers, unloading of hangars and cutting of film corners with good vision. The tank may be installed through a wall as a water pass—one-half in the darkroom, the other in the adjoining light room. It is available in 30 and 48 in. inside length size.

GENERAL ELECTRIC CO., Milwaukee 14.

* * *



Better Sonic Inspection

268 ULTRASONIC thickness measurements of weldments and castings may be made with a higher precision than formerly with a new "Audigage" ultrasonic micrometer. Measurements within ½ of 1% of actual thickness have been obtained on such homogeneous materials as steel, brass, aluminum, copper, glass, lucite and other dense substances.

The ultrasonic micrometer is designed to operate with precision over an infinite series of relatively narrow thickness ranges between 0.010 and 12 in. Plug-in frequency coils and matched dials for any desired frequency, both of which are readily interchangeable without disassembly of the instrument, permit the selection of the one specific frequency best suited to the required thickness-range.

BRANSON INSTRUMENTS, INC., Samford, Conn.

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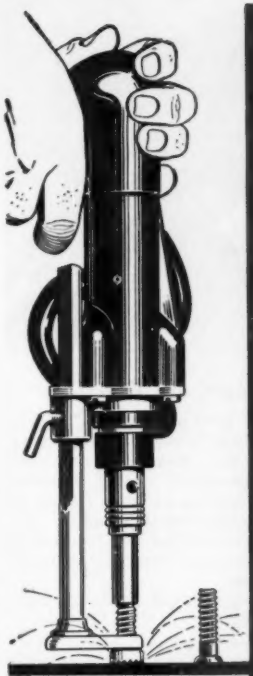

AN ELECTRIC ARC WELDING PROCESS

DRILLING, TAPPING AND BOSSES ELIMINATED

...A superior switchgear product plus 20 *per cent reduction in its selling price*, resulted from Nelwelding, according to a leading manufacturer.

MANUAL ARC WELDING ELIMINATED

...Elimination of a manufacturing bottleneck by using the Nelweld method enabled a boiler company *to boost production 25 per cent.*

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...By taking the tool to the work, Nelweld not only reduced material handling costs but cut fastening time on large coal pulverizers from 8 hours to approximately 53 minutes.

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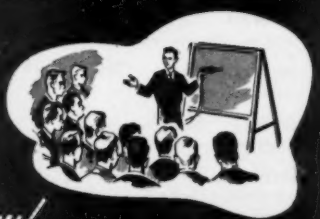
...Man-hours saved by Nelwelding in making refrigerator cars enables a leading car shop to increase productivity *one car per day.*

...OFTEN STEM FROM A NELWELD FASTENING CLINIC

• The Nelweld clinic can show you—right in your own plant how you can benefit from this modern fastening method.



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Fasten it Better...at Less Cost, with NELWELD

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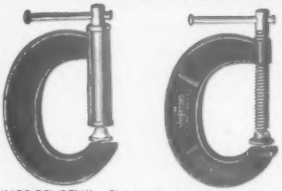
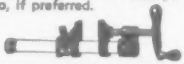
DIVISION OF GREGORY INDUSTRIES, INC., LORAIN, OHIO

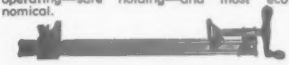
"Jorgensen" and "Pony"
CLAMPS for WELDERS:



"JORGENSEN" Shielded Welders' Clamps eliminate damage from "spatter", and are low-priced. "Regular" "C" clamps are available too, if preferred.



"PONY" Clamp Fixtures make ideal bar clamps on any length of black pipe. Fast operating—sure holding—and most economical.



"JORGENSEN" Steel Bar Clamps are designed for the severe requirements of welding service; exclusive "multiple disc clutch" makes for instant adjustment—economy. The trade-mark "JORGENSEN" or "PONY" on your clamps is assurance of utmost satisfaction in service—specify and insist upon them from your supplier. FREE CATALOG ON REQUEST.

ADJUSTABLE CLAMP COMPANY
"The Clamp Folks"
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Air-Acetylene Torch

269 THE "Torch-O-Matic," a handy 12-oz pistol-shaped air-acetylene torch is said to be well-suited for a wide variety of work, including silver soldering, sweating copper fittings, straightening fenders, etc. Flame is produced at a squeeze of the trigger and instantly shuts off on release.

VELOCITY POWER TOOL CO., Pittsburgh, Pa.

* * *

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270 For use in repair shops, garages and farms, the new Mid-States Model 175-BC combination a-c arc welder and battery charger is reconnectable for 110 or 220 volt operation. Amperage range is 15 to 175, rated output is 140 amp. Open circuit-voltage is 65. Power factor correction is 75%. Duty cycle above rated amp. load is 20%, in line with REA specifications.

MID-STATES WELDER MFG. CO., Chicago 36.

Cut costs on these
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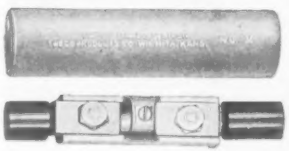

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A permanent splice to repair broken welding cables. Install with a wrench (or solder if desired) for a quick and efficient connection. Insulated with a tough fiber sleeve. 3 sizes for cable #6 through 4/0.

Use TWECO cable connections to improve your welding efficiency. Ask for TWECOLOG No. 8 with complete specifications and prices.

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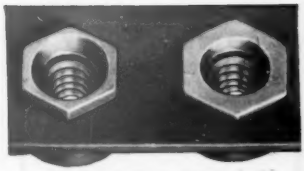

Nuts for Thin Metal

271 NEW Gripco "Clinch" nuts can be used on aluminum, brass or other metals which cannot be readily stud welded, on blind assemblies or to furnish additional threading depth for applications of bolts in thin metals. This nut is round with a hexagon-shaped pilot which fits snugly into a hex-shaped hole in the metal to which it is being applied. The pilot of the nut is then pressed down and flattened out, clinching the nut securely in the hex-hole. The special pilot in the hex-hole prevents the nut from turning when the bolt is applied or removed.

GRIP NUT CO., Chicago 4.

* * *

Rolling Thin Strip

272 CUSTOM rolling of most ferrous and nonferrous thin strips is available from an eastern firm. It supplies strip in widths up to 8-in. in thickness down to 0.0005 in. Metals include aluminum alloys, copper, brass, chrome-iron alloys, Stellite, Monel, silver, etc.

INDUSTRIAL PRODUCTS DIV., American Silver Co., Flushing 54, N. Y.

New Product Briefs

273 **Free rinsing,** soluble liquid steam cleaning compound, Turco 3232 is said to be safe on reactive metals and painted surfaces, such as plain or anodized aluminum alloys. Turco Products, Inc., Los Angeles 1.

* * *

274 **J.I.C. power units** are now manufactured by Superdraulic Corp., Detroit 4, Mich., in 30, 60 and 80 gal standard sizes. The Superdraulic design features ample floor clearance, large tank cleanouts in both ends, sight gages.

* * *

275 **Aluminum anti-rust** paint known as PCA-102 can be applied by brush or spray right over rust without priming, scraping, wire brushing or sandblasting. It penetrates the rust and seals the base metal against further rust action. Paint Corp. of America, Cleveland 14, O.

A *Robotron* "Cushioned-Power" Welding Cycle

OSCILLOGRAPHIC PATTERN OF CONTROLLED WELDING CURRENT

Why "CUSHIONED POWER" ASSURES BETTER WELDS

Robotron has developed an entirely new concept of Vernier Control that preheats and prepares the welding material, then welds and tempers according to specific needs. This is particularly important in the welding of metals with either very narrow or with two different plastic ranges. Oscillographic illustration above clearly shows the various adjustable stages of a "Cushioned-Power" welding cycle. PREHEAT stage assures proper seating of electrodes, cutting down surface resistance and increasing WELD heat where it's needed. It also decreases surface indention, spewing of metal and lengthens life of electrodes. The DECAY or TEMPER stage controls rate of heat flow into the surrounding metal after weld is over, definitely controlling brittleness and in case of Coated Metals, allows coating or plating to resurface the weld. All types of Copper, Brass, Aluminum, Stainless and Nickel Alloy Steels, Coated or Plated Metals or any Combination of Dissimilar Metals regardless of conductility can now be welded together with minimum surface indentation, maximum ductility and constant uniformity. Other features include:

- Reduces Weld Power KVA (heat) demand.
- Reduces Weld Power Transients.
- Reduces usual required Electrode Pressures.
- Reduces Usual Electrode Pickup and Cleaning.
- Cushions impact on welding lines.
- For "critical" welds, it permits greater latitude of weld power control.
- Can be used in Single Phase Welding.
- Easy to attach on old or new welding equipment.

Compact, sturdy and easy to install, control and maintain, Robotron "Cushioned-Power" Welding Timers are time-tested and proven like all other Robotron Electronic Control Equipment. Investigate today how to increase your welding production and quality at less cost job-after-job. No obligation, of course.

A "Cushioned-Power" control for adding to present weld timer equipment.

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These low-melting alloys make high strength, leak-proof, vibration resistant joints at LOW MATERIAL AND LOW LABOR COSTS.

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THE CINCINNATI TOOL CO.
1944 Waverly Ave., Cincinnati 12, Ohio

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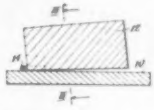
From the Patent Office

Fusion Joining Method

2,598,027. James Weir and Charles H. Dulin, Cleveland. Assigned to Aluminum Company of America. Filed May 18, 1948. Granted May 27, 1952.



A newly patented method of making a join between metallic members involves a zone of jointure defined by a member of varying section width positioned above the member to which it is to be joined. The steps include assembling the first mentioned member above and in contact with the second member at a point defined by a narrow width of the first member. The members are adjusted to position a wider width of the first member at a lower elevation than the point of contact between the members. The members are progressively separated from the point of contact towards the wider section. A fusible joining material is provided next to the point of contact. By raising the fusible metal to melting temperature, the melt under gravitational and capillary attraction distributes itself over the zone of jointure to completely fill the intervening space between the members and provide filleted joints between them.

* * *

Arc Starting Method

2,596,165. Harold S. Payne, Cleveland. Assigned to The Lincoln Electric Co. Filed May 6, 1949. Granted May 13, 1952.

This patent pertains to a welding process wherein an arc between a metal electrode and the workpiece is the welding instrumentality. The method consists of applying to the surface of the workpiece where the arc is to be struck a composition consisting of mobile granule-containing material. The latter comprises a major part of ferros-ferric oxide and a minor part of an alkali-metal nitrate and intermixed with it. To further obviate sticking each time the electrode is removed and recontacted, the granule compound is freshly applied every time.

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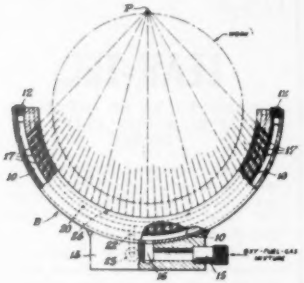
AWP Aluminum Welding Wire offers the welder an aluminum welding wire specifically designed for Argon or Heli-Arc applications where clean oxide and dirt-free surface is imperative. Manufactured by a modern process AWP Aluminum Welding and Brazing Wires will enhance the speed strength and efficiency of your welding. AWP Aluminum Welding and Brazing Wires are available in all standard alloys and forms.

ALUMINUM
WIRE PRODUCTS CO., INC.
9 Naubuc Ave., Glastonbury, Conn.

Glass Welding Method

2,595,555. RAYMOND A. WOLF, Maplewood, N.J. Assigned to Union Carbide and Carbon Corp. Filed Aug. 23, 1948 Granted May 6, 1952.

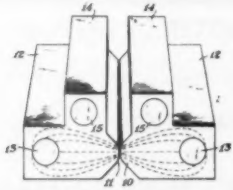


This patent covers a method for butt welding members having surfaces of revolution in aligned relation with their opposed ends to be welded spaced apart. The improvement here comprises directing from an arcuate series of flame ports outside the periphery of the members into the space between the opposed ends of the members, a series of coplanar oxy-fuel flames converging to a point beyond the periphery of the members. This is opposite the flame ports whereby the fishtail caused by impact of the several flames extends outside the periphery of the members.

* * *

Welding Plastic Films

2,596,933. ELMER L. KIRK. Midland Mich. Assigned to The Dow Chemical Co., Midland, Mich. Filed Jan. 31 1951. Granted May 13, 1952.



This patent refers to a machine for welding superposed layers of thermoplastic films. An opposed pair of welding shoes are made of a dense and thermally conductive metal of high heat capacity. Each such shoe has a toe with a slightly crowned working face, and a rearwardly extending solid metal main body with a socket distant from and parallel to the working face. A heating element is inserted in the socket. A monitor member is vertical to the main body and disposed rearwardly from the working face and a head of the heater socket.

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GB No. 45 Silver Solder, melting range 1125-1145°F
GB No. 41 Silver Solder, melting range 1125-1160°F
GB No. 35 Silver Solder, melting range 1130-1270°F
GB No. 31 Silver Solder, melting range 1130-1300°F

And, if you require a special Silver Solder, Goldsmith's Technical Service Division is ready to give you competent assistance — their recommendations will be backed by 80 years of experience in alloying and refining precious metals.

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Produced under strict laboratory control, GB Fluxes are fully active, deep penetrating, stable and economical. While developed primarily for use with GB Silver Solders, they produce high quality joints with any good silver solder.

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Here's down-to-earth information on the important phases of low temperature brazing. You can get a free copy from your GB Distributor — Write us and a copy will be forwarded to you.

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WELDING CLAMPS
• Designed for Welding •
No Threads To Damage

1. Case Hardened threads are always protected from weld spatter and never exposed to damage in open or closed position.

2. The clamp body is cut from solid plate, thereby insuring extreme rigidity and giving great resistance to bending or twisting.

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23 stock sizes

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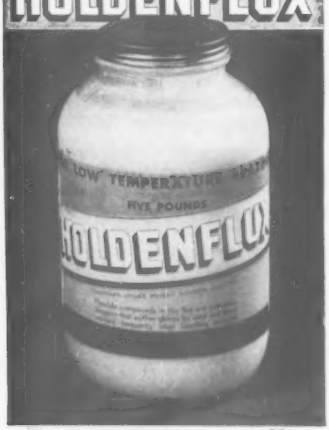
HOLDENFLUX



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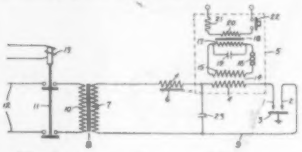
FOR BRAZING CAST IRON, STAINLESS, COPPER, STEEL, SPECIAL APPLICATIONS
Two Shipping Points: New Haven and Detroit

The STANDARD SUPPLY COMPANY
460 WE Grand Ave., New Haven, Conn.

Arc Welding Method

2,599,281. EVERETT F. POTTER, Schenectady, N. Y. Assigned to General Electric Co. Filed Dec. 23, 1949. Granted June 3, 1952.

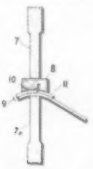


Newly patented arc welding apparatus includes a pair of a-c conductors having opposite polarities. Two electrodes have at arcing temperatures the same but substantially different electron emissivities than the work to be welded. When an arc is established between each of the electrodes and the work, the arc has a greater electric resistance to current flow with one electrode polarity than with the rverse electrode polarity. There are means for connecting one of the electrodes to one of the alternating current conductors and the other of the electrodes to the other of the a-c conductors. The circuit between the electrodes is completed through work parts positioned opposite the electrodes. Means are provided for positioning the electrodes at about the same arcing distance from the work. Other means simultaneously establish arcs between each of the electrodes and the work to produce zones of fusion in the work opposite each of the electrodes.

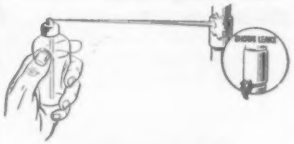
* * *

Resistance Welding Process

2,599,045. GEORGE R. BROLASKI, San Diego, Calif. Assigned to Rohr Aircraft Corp., Chula Vista, Calif. Filed Sept. 12, 1950. Granted June 3, 1952.



This patent covers a welding machine for resistance welding the laminations of a workpiece. It has upper and lower welding electrodes composed of material having a high electrical conductance. They are spaced apart to receive the workpiece between them. A long protective strip made of the same material as the electrodes is in contact with the top of the workpiece and extends beyond both sides of the upper electrode a distance at least as great as the diameter of the tip of the electrode. The thickness of the strip is greater than the thickness of the workpiece.



LEAK-TEC

QUICKLY SHOWS UP ANY SMALL LEAKS IN WELDED SEAMS OR JOINTS

Just apply compressed air to the equipment being tested. Spray LEAK-TEC on area where a leak might occur. LEAK-TEC shows up the leaks by forming durable and lasting bubbles.

LEAK-TEC quickly detects all gas leaks —even minute leaks that will not show up by flame test or other ordinary means.

LEAK-TEC is a new development—specifically designed for detection of leaks. It spreads over cracks and crevices and creates a growing cluster of living bubbles wherever a leak occurs.

LEAK-TEC is furnished in flexible, plastic bottles, light in weight, HAND SIZE, easy to carry.

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FASTER . . . Hi Heats
Large Rods

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No Slag

25% MORE COVERAGE

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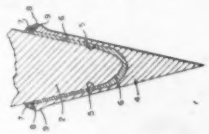
SOMETHING NEW
Bergstrom H. F. M. 600
(Pat. Pending)
For making a Surface of 600 Brinnel Hardness on Manganese.

INDUSTRIAL OVERLAY METALS Inc.
EATON - - OHIO

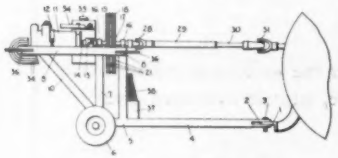
Repointing Dipper Teeth

2,603,985. BENNIE J. VIDMAR, Mount Iron, Minn. Filed Sept. 29, 1949. Granted July 22, 1952.



This method of repointing a worn dipper tooth consists of inserting the worn end of the tooth into a preshaped cavity in a molded cap. The cavity is filled around the tooth with molten metal having nonfusing qualities with respect to the tooth. The molten metal is cooled and then the upper edges of the cap are welded to the tooth.

* * *



Portable Arc Welder

2,600,643. WESLEY HAGELGANTZ, Bazine, Kans. Filed March 16, 1949. Granted June 17, 1952.

This patent describes a portable welder mounted on a wheeled frame having upright members. A drawbar is on the forward part of the frame for hitching to a tractor or similar vehicle. An offset frame extension projects backward from the upper part of the frame. A d-c generator is mounted on the offset frame extension. A pair of speed step up drive members are mounted between the spaced members of the upright frame. Between the generator and one of the drive members is a shock absorber coupling. A telescopic driving connection is between the other drive member and the power take-off on a tractor or similar vehicle. A reactor coil is connected to the generator and is supported between the upright and offset frames.

* * *

Inert-Arc Welding Nickel

2,602,871. ROBERT A. NOLAND and CHESTER T. SZYMKO, Chicago. Assigned to the United States of America as represented by the U. S. Atomic Energy Commission. Filed Sept. 19, 1950. Granted July 8, 1952.

This patent refers to a shielded-arc welding process for joining nickel and nickel-base alloys. The shielding gas used is a mixture of 5-15% by volume of hydrogen and from 95-85% by volume of argon.

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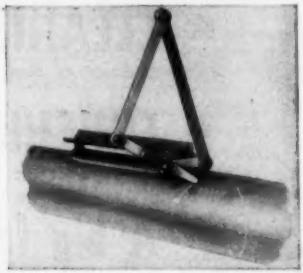

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★ **BRAZING**—An article covering the fabrication of stainless steels using silver brazing alloys.

★ **CLEANING**—This article is devoted to the pre-weld and post-weld cleaning of stainless steels.

★ **FINISHING**—Covering a most important operation, this article will be devoted to the grinding and polishing of welds on stainless steel fabrications.

★ **A big feature of this issue will be a comparable trade name data sheet covering stainless steel electrodes.**

The October issue of THE WELDING ENGINEER will be the Metal Show Number and will cover the Show in its usual full fashion. Program of the Show and the annual meeting of The American Welding Society will be given full play. If you can't get to the Show in Philadelphia, this issue will tell you all about it!

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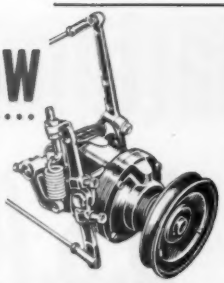

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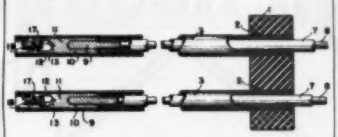
Carbon Arc-Torch

2,603,736. HENRY WILLIAM SNYDER, Bozeman, Mont. Filed June 7, 1950. Granted July 15, 1952.



This patent covers an electrode holder for a carbon-arc torch or the like that has a pair of electrical conductor carrying tubes of resilient insulating material. There are means for rigidly securing an end of each of the tubes so that the tubes will extend in normally parallel relationship but subject to being flexed so that their outer ends may be brought toward or away from each other under control of the hand of the operator. Current carrying conductors go into each of the tubes from the secured ends. An electrode holder is connected with the end of each conductor with the free ends of the tube. The tubes have holes through opposite walls next to their free ends through which electrodes carried by the holders can extend sideways from the tubes and angularly toward each other at one side of the tubes. The electrode holders include electrode holding clamps and means for securing them in the tubes for positioning the electrodes in line with the apertures in the tube walls.

• • •

Wire Welding Process

2,603,735. ADOLF G. BUTLER, Hawthorne, Calif. Assigned to American Pipe and Construction Co. Filed Sept. 12, 1949. Granted July 15, 1952.

This patented method of joining a pair of wires in end-to-end relation includes driving a tightly-fitting sleeve on the end of each wire. The ends of the wires are placed in abutting relation and an electrical current is passed through them. The current is of sufficient amperage to heat the wires and sleeves to fusion temperature. The wires and sleeves are forcibly pressed together axially to forge the joint and upset the ends of the wires and sleeves.

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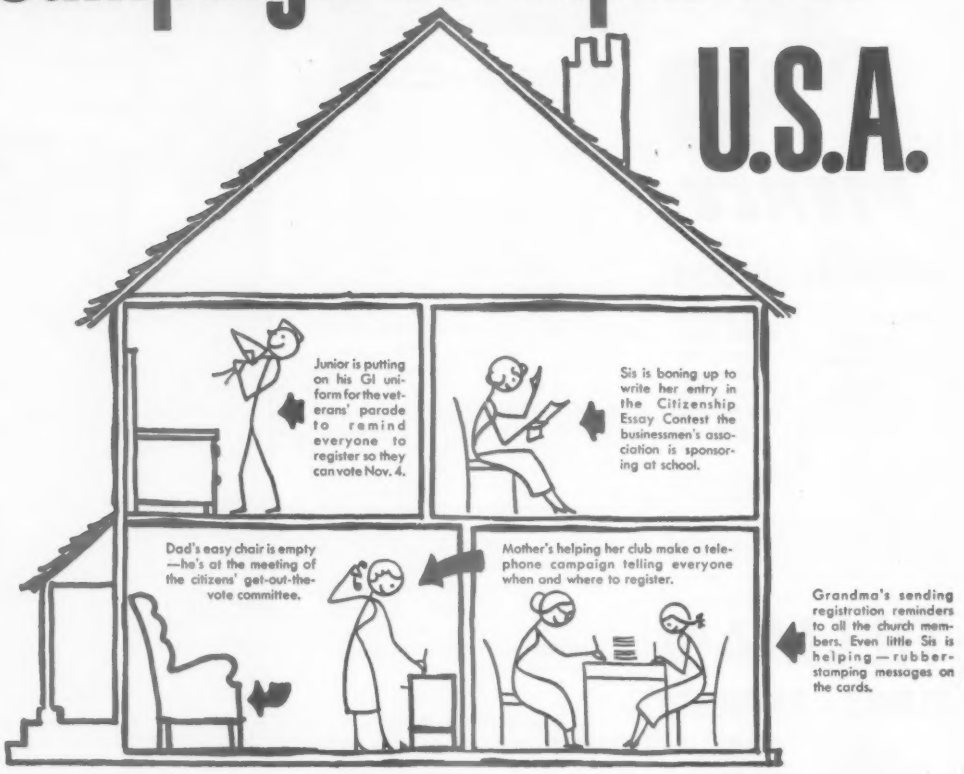
Junior is putting on his GI uniform for the veterans' parade to remind everyone to register so they can vote Nov. 4.
Sis is boning up to write her entry in the Citizenship Essay Contest the businessmen's association is sponsoring at school.
Dad's easy chair is empty —he's at the meeting of the citizens' get-out-the-vote committee.
Mother's helping her club make a telephone campaign telling everyone when and where to register.
Grandma's sending registration reminders to all the church members. Even little Sis is helping—rubber-stamping messages on the cards.

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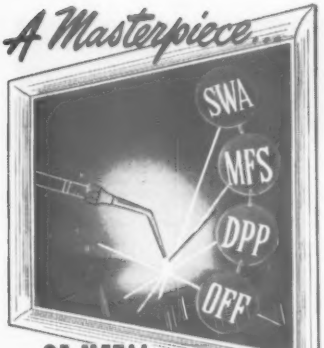

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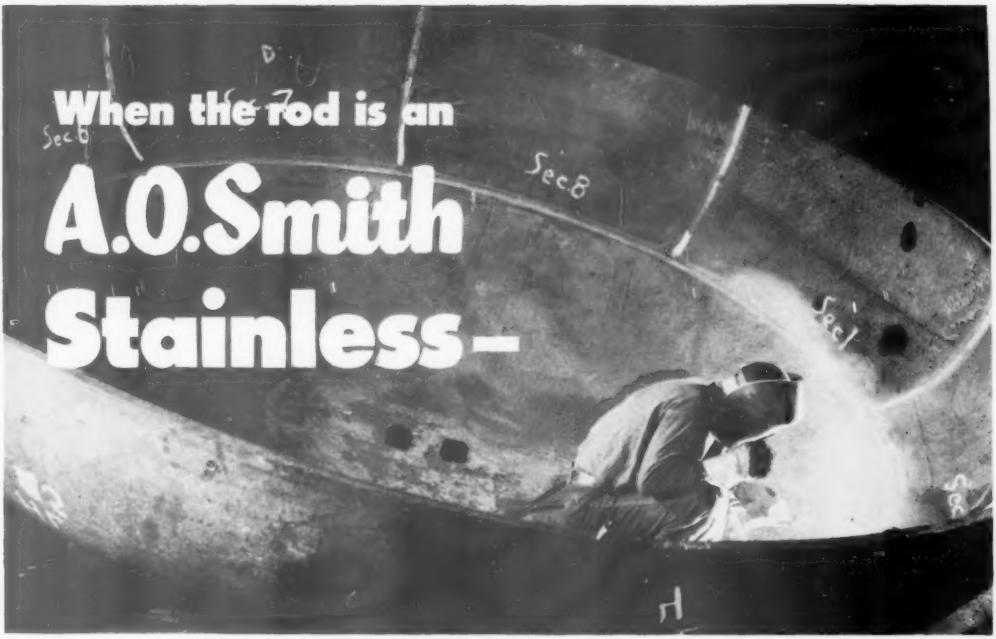

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